

# CANADIAN GEOGRAPHICAL JOURNAL

FEBRUARY  
1944

VOL. XXVIII  
No. 2



**RESEARCH IN PRAIRIE FARM REHABILITATION**

**POTTERY IN CANADA**

**BLACK WIDOW: THE WORLD'S MOST DANGEROUS SPIDER**

**THE KITSILANO MASKS**

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The articles in this Journal are indexed in the *Reader's Guide to Periodical Literature* and the *Canadian Periodical Index* which may be found in any public library.

The British standard of spelling is adopted substantially as used by the Dominion Government and taught in most Canadian schools, the precise authority being the Oxford Dictionary as edited in 1936.

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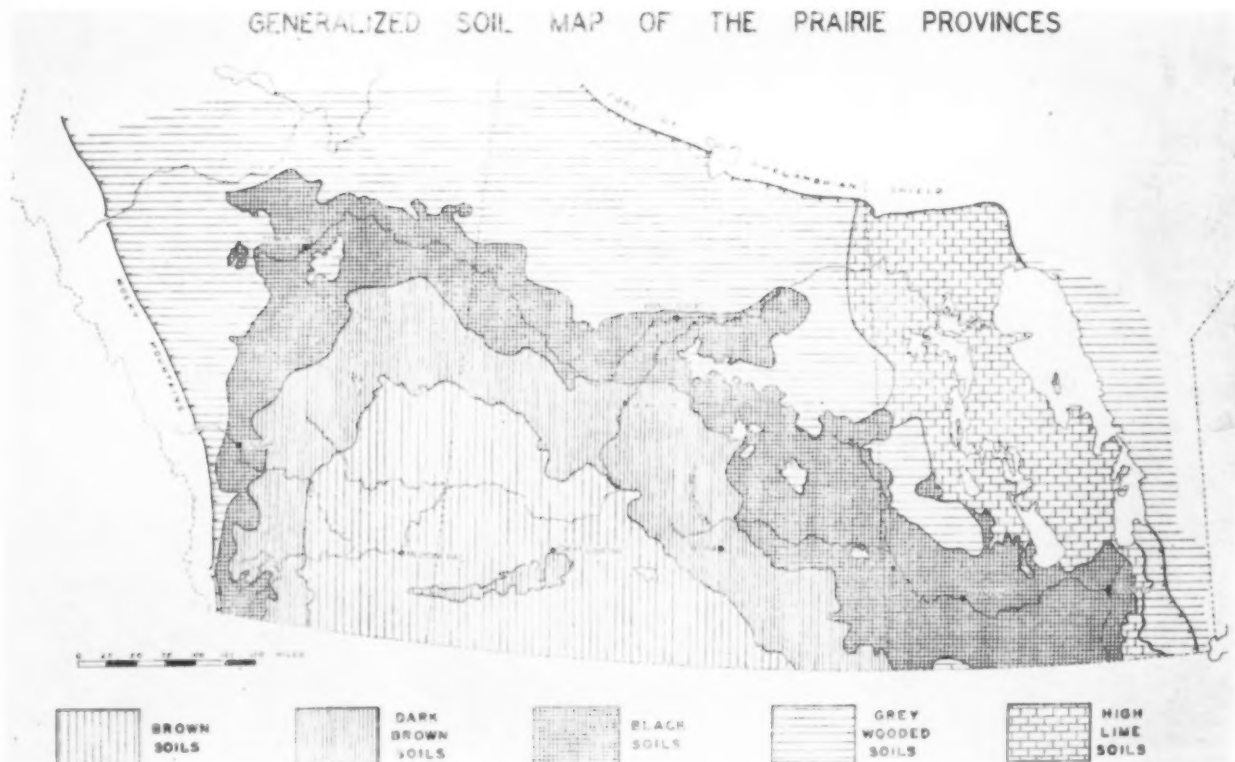
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Irrigation. By research and demonstration, the Experimental Farms contribute to development of irrigation under the P.F.R.A.

# GENERALIZED SOIL MAP OF THE PRAIRIE PROVINCES





# RESEARCH IN PRAIRIE FARM REHABILITATION

by E. S. ARCHIBALD and Wm. DICKSON

THE Prairie Farm Rehabilitation Act (P.F.R.A.) was passed by the Parliament of Canada in 1935 for the purpose of assisting prairie farmers to adopt such modifications in farm practice and management as would enable them to continue operations despite the then prevailing emergency arising from drought and economic depression. The background and organization of the P.F.R.A. programme, especially as regards the work therein of the Dominion Experimental Farms, has been described by the senior writer in a previous article in this Journal (Prairie Farm Rehabilitation, October, 1940). The purpose of the present article is to review, briefly, the progress of P.F.R.A. work to date, and to deal with some of the results secured in research conducted under the Act.

## *The Prairie Farm Rehabilitation Programme*

The essential characteristic of the P.F.R.A. programme has been that of assisting prairie farmers to solve for themselves the various problems in farm operation that emerged during recent severe conditions of drought and soil drifting. There has been, it is true, some provision of material assistance in the form of free trees, special seeds, tractor fuel and of special implements, but only to the extent of stimulating rather than of replacing private initiative. The bulk of P.F.R.A. expenditures, which amounted to nearly eighteen million dollars by the end of 1943, has been directed to modifying the physical environment of prairie agriculture through water development and improved land use, and to research and demonstrations on prairie farm practices.

Through water development or the creation of water storage facilities for domestic, stockwatering or irrigation purposes, the environment of prairie agriculture has been appreciably modified for the better. Under this phase of the programme there had been constructed by the end of 1942, some 58 large P.F.R.A. water development projects, providing storage facilities for 400,000 acre-feet of water and

for the irrigation of 172,000 acres of land. In addition there had been completed 331 small community projects and 19,857 small projects on individual farms. These small community and individual projects comprise 14,811 dugouts, 4,325 stockwatering dams, and 1,052 irrigation schemes. In the aggregate, over 30,000 prairie farms, formerly with little or no water for farm use, now possess satisfactory water storage facilities. The effect of this development on livestock production, so important under the current war emergency, will be readily apparent.

In the field of land use, the major P.F.R.A. activity has been the permanent removal of large areas of sub-marginal land from cultivation, and the use of such land for grazing in community pastures. During 1942 over 1,200,000 acres in 63 community pastures provided controlled grazing for 38,000 head of livestock. The removal of this land from unprofitable crop production, and its reclamation for pasture, has both tended to limit crop production to better land and to benefit livestock production in connection with ordinary farm enterprises.

The water development and land use phases of the P.F.R.A. programme are supervised from the Prairie Farm Rehabilitation Office in Regina, Saskatchewan.

The P.F.R.A. cultural programme, dealing with the problems of crop and livestock production, is supervised through the Dominion Experimental Farms. As outlined in the previous article, this branch of the Dominion Department of Agriculture has been intimately connected with prairie agriculture since 1886. Equipped with half a century of scientific and practical experience in prairie agriculture, the Experimental Farms undertook, in 1935, the work of organizing the P.F.R.A. programme in general, and, in particular, of guiding prairie farmers in the adjustment of their farm practices to the relatively unfamiliar conditions imposed by the drought crisis. In the latter phase of P.F.R.A. work, which constitutes the cultural programme, two methods of ap-

proach to the farmer were adopted. On the one hand the best known practices for combatting drought and soil drifting were demonstrated under actual farm conditions; on the other, farmers throughout whole communities were encouraged and assisted to adopt these practices on a co-operative basis. The principal demonstrational work has been conducted on District Experiment Substations, of which 47, supervised from seven prairie Experimental Farms, were in operation in 1943. Organization of co-operative work by farmers is effected through 229 Agricultural Improvement Associations (A.I.A.'s), each serving a community, and with an aggregate of 36,000 members. Other P.F.R.A. cultural agencies include some 17 land reclamation projects, several hundred grass seeding demonstrations, four large-scale tree-planting experiments, and various research projects. One important feature of P.F.R.A. cultural work is a considerable amount of Dominion-Provincial co-operative research. In the following outline of P.F.R.A. cultural research several of the points touched on above will receive amplification.

#### *Agricultural Research under the P.F.R.A.*

Research under the P.F.R.A. has been directed to the solution of problems in prairie agriculture which have emerged from or been accentuated by the drought crisis of recent years. For the most part these problems have been connected with the management and optimum utilization of the soil as in the control of soil drifting, the production of crops under conditions of low and variable rainfall, the use and improvement of lower quality lands for grazing, and the improvement of living conditions on prairie farms through tree planting, horticulture and subsidiary livestock production.

Methods of research have ranged from controlled laboratory and field experiments and investigations to field trials in co-operation with farmers. The fact-finding possibilities of all forms of P.F.R.A. enterprise have been kept in mind.

While the bulk of P.F.R.A. research has been conducted directly by the Experimental Farms, certain special studies have been made in co-operation with the Farms by other branches of the Dominion Government, and by the universities of each of the three Prairie Provinces.

In the outline presented below of P.F.R.A. research the principal topics covered are soil surveys, soil drifting control and land reclamation studies, grass and grassland research, and various special studies on the properties and management of prairie soils.

#### *Soil Surveys*

The purpose of a soil survey is to determine the location and extent of different soil types, and to classify these soil types according to their nature, properties and possible use. Obviously, information of this nature is of fundamental importance for the best use of land resources. It is a remarkable fact, however, considering the antiquity of agriculture, that the practice of mapping and classifying soils is of quite recent development, and that soil surveys in the Prairie Provinces should have followed rather than preceded the settlement of most of the arable land.

The first soil surveys in the Prairie Provinces were conducted by the Topographical Survey of the Dominion Department of the Interior. These surveys, started in 1919 and discontinued in 1930, covered 8,662,880 acres in nine separate areas along the northern fringe of settlement.

Soil surveys under the auspices of the provincial colleges of agriculture, in some cases with financial assistance from the Dominion Experimental Farms, were started in Saskatchewan and Alberta in 1921 and in Manitoba in 1926. Considerable progress was made both as regards the acreage covered and the evolution of a satisfactory system of classification, until about 1930 when economic depression slowed up the work. Prior to the inauguration of the P.F.R.A. programme, soil surveys had been made of 1,336,320 acres in Manitoba, approximately 64,000,000 acres in Saskatchewan, and 11,360,000 acres in Alberta. In addition, the agricultural possibilities of some 24,000,000 acres in the sparsely populated areas of northern Alberta had been explored.

Since the inception of the P.F.R.A. programme in 1935 a sustained effort has been made to complete the soil surveys of the more settled areas of the Prairie Provinces. By the end of 1943 practically all of the area coming under the provisions of the P.F.R.A. has been covered. Specifically,

to the end of 1942, the total area covered by soil surveys in the Prairie Provinces was 140,800,000 acres, of which 42,413,500 acres were surveyed under the P.F.R.A.

This work has been conducted co-operatively by the Experimental Farms and the Soils Departments of each of the three provincial universities.

This survey work has made it possible to present a comprehensive outline of soil conditions on the Canadian prairies. Prairie soils exhibit to a marked degree the combined influence of gradations of climate and vegetation, modified locally by topography and texture. The controlling climatic factor is rainfall effectiveness, roughly the balance of rainfall over evaporation, which increases zonally outwards from the south-central region, producing a corresponding zonal increase in the growth of native vegetation from the "short grass" of the semi-arid south central region, through the long grass and parkland belts to the forested areas which border the prairies.

These gradations of climate and vegetation exert a distinct influence on both the properties and adaptability of prairie soils.

In the southwestern short grass region the chief visible characteristic is the light brown colour from which the area derives the name of "brown soil zone". This colour is due to a relatively low content of organic matter, the result of sparse vegetation and rapid oxidation. These soils show only slight evidence of leaching, soluble salts being accumulated in "lime" and "gypsum" layers near the surface, while surface accumulations or "alkali" spots are of frequent occurrence. The region occupied by the brown soils forms a rough triangle of about 34 million acres in area, with its base extending along the International Boundary, from Estevan in southeastern Saskatchewan to Coutts in southeastern Alberta, and with its apex just east of the town of Coronation in Alberta.

Beyond the brown soil region in a zone ranging in width from 40 to 80 miles, and covering some 30 million acres, occur soils of a dark brown colour which reflect the influence of more favourable climatic conditions. These soils, developed under a heavier grass cover than the brown soils, possess a correspondingly higher content of organic matter and have been subjected to a greater degree of leaching. Much of the best wheatland in Western Canada is found in the dark brown zone.

East and north of the dark brown soil zone, and running diagonally across Saskatchewan from southern Manitoba to the district of Edmonton, Alberta, occurs a belt of black soils, corresponding roughly to tall grass parkland. These soils developed under sub-humid conditions are characterized by high humus content, high fertility and greater evidence of leaching than in the brown soils. Constituting the most fertile farmland, though not necessarily the best wheatland, in Western Canada, the black soils cover an area of about 42.5 million acres.

Beyond the black zone the soils grade off through a transitional zone to the grey wooded soils of the northern forest, which differ profoundly from the grassland soils of the prairies. The grey wooded soils have been subject to relatively heavy leaching with the resultant loss of much plant food. In some districts, notably central Alberta, the low fertility of the grey wooded soils can be satisfactorily remedied by fertilizer treatments, growing legumes, and the application of sulphur.

Throughout the Prairie Provinces the major soil characteristics are modified by differences in texture. This is particularly the case with heavy clay soils which form such highly fertile areas as the Red River Plains, the Regina Plains and the Drumheller clays. On the other extreme, dune sands present areas entirely unsuited for farming in several districts, notably near Brandon, Manitoba, and in the Great Sand Hills of Saskatchewan. The bulk of prairie soils are intermediate in texture. In this connection it should be noted that while textural differences, as between sand and clay, for instance, affect more profoundly the use and productivity of soil than do zonal differences, the distribution of types of farming conform very largely to the soil zones. In fact, prior to the construction of the Canadian Pacific Railway in 1885, agricultural settlement showed a marked tendency to follow the broad arc of the black soil zone, as affording the best all-round opportunities for farming.

Much of the information secured in soil surveys in the Prairie Provinces has been published in reports, with accompanying maps, and additional reports are in course of preparation. This information is of fundamental importance to both practical and technical agriculturists as well as to administrative officers. The practical agriculturist is enabled to compare the results



Strip farming for drift control. Long, narrow strips of crop, alternating with strips of fallow, provide some control of soil drifting.



Trash cover. Tillage practices which retain stubble in the surface soil help to control drifting.

Below:—Listed furrows for trapping drift soil.



of various cropping and tillage practices on different types of soil, and on the same soil type in different localities. In technical agriculture a comprehensive knowledge of the location and properties of soil types is basic to all agronomic research, and in the application of its results. For administrative purposes soil survey data is invaluable in the development of various production and settlement policies, in the assessment of lands for taxation and in the distribution of public utilities.

#### *Research on the Causes and Control of Soil Drifting*

To stop the ravages of soil drifting on the Canadian prairies was the most pressing problem of the P.F.R.A. programme at its inception. The causes of drifting were easily apparent. Dry soil unprotected by vegetative cover and depleted of soil-binding organic matter was readily eroded by strong winds. Drifting, once started on focal points, spread rapidly to neighbouring areas to destroy or injure growing crops. The most obvious remedy, to re-establish vegetative protection, was attended with considerable difficulty. During the worst of the crisis the growth of crops was retarded by drought, while crops once started might succumb to drifting. Further, the necessary use of the cultivated summer-fallow for moisture conservation resulted in the exposure of a larger percentage of crop land. The key to control, therefore, was to prevent drifting on summer-fallow land. Where this could not be done a permanent cover of grass had to be established by whatever methods might be possible.

At the beginning of the P.F.R.A. programme the Experimental Farms endeavoured to secure the adoption by farmers of soil drifting control measures which had already proved effective. One effective measure, strip farming, had been developed in the Monarch area of southern Alberta. This practice which consists of growing crops in long, narrow strips, in alternation with similar strips of fallow, reduced the cumulative effect of drifting sufficiently to enable crops to be grown with a minimum of erosion damage. Another effective control measure was to till summer-fallow land in such a manner as to retain dead weeds and stubble on the surface as much as possible, thereby providing a protective "trash cover". To maintain trash cover the use of the mouldboard plow was abandoned in favour of such surface tillage implements as the cultivator, one-way disc and rod weeder, thereby securing a "ploughless fallow". Where trash cover was deficient the use of deep listed furrows im-



parted an eddying effect to air moving on the surface of the ground, and so checked the erosive force of winds. During the course of P.F.R.A. cultural work it was found that the foregoing practices provided effective control of drifting on the majority of soils.

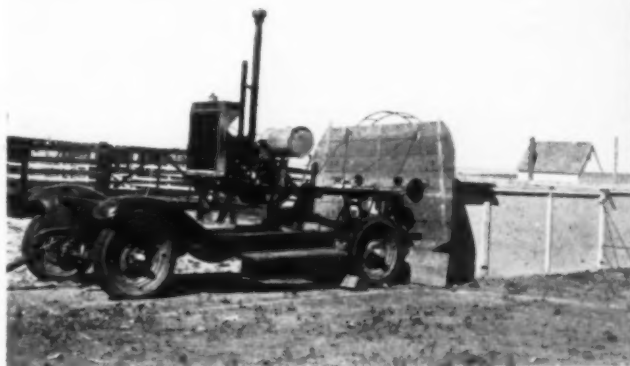
While the causes of soil drifting are easily recognized, and the remedies comparatively simple, there are within the general problems many particular problems the solution of which requires considerable study. Different soil types vary in their susceptibility to wind erosion while the efficiency of different control measures is not the same on all soils. These and other phases of the soil drifting problem are dealt with in field studies on Experimental Farms, District Experiment Substations, reclamation projects and at the Soil Research Laboratory at Swift Current, Saskatchewan, which was opened in 1936 as part of the P.F.R.A. programme. One interesting feature of research technique at this laboratory is the use of wind tunnels to study soil drifting under strictly controlled conditions. Two of these tunnels, one stationary and one portable, are in use. It is the function of the Soil Research Laboratory to make accurate measurements of effects observed in the field and to discover the underlying principles involved.

Certain interesting facts have been learned from soil drifting investigations. There is convincing evidence, for instance, that the tendency of prairie soils to drifting will remain a permanent hazard to cereal culture, and that this tendency will increase the longer the land is under cultivation. Comparable samples of virgin and cultivated soil of various types, brought to identical conditions of tilth, were subjected to wind tunnel erosion tests. It was found that the samples from cultivated areas drifted more readily than those from virgin areas. It would seem, therefore, that cultivation and cropping for a period of years produces some changes, aside from loss of plant fibre, which increases erodibility. This tendency is also a matter of general observation.

That prolonged cultivation, especially under the prevailing system of cereal culture, has produced considerable alteration in the chemical composition of prairie soil, is evident from P.F.R.A. investigations conducted by the University of Alberta. In comparable cultivated and virgin areas at a large number of points throughout the Prairie Provinces it was found that the average loss through cultivation from the surface six inches amounted to about 20 per cent of the



Soil Research Laboratory, Dominion Experimental Station, Swift Current, Saskatchewan,—a main centre of research on soil drifting and allied problems of prairie agriculture



Portable wind tunnel for research on soil drifting. By means of this apparatus the erodibility of different soil types can be accurately determined. An aeroplane propeller forces a stream of air through the tunnel at right.

Below:—Some of the meteorological equipment for soil drift studies at the Soil Research Laboratory



nitrogen and 40 per cent of the organic matter originally present in prairie soils. In brown, dark brown and black soils the average losses of nitrogen have amounted to 989 pounds, 1090 and 1667 pounds per acre respectively, while for organic matter the corresponding losses were 28,696 pounds, 30,036, and 40,278 pounds per acre respectively. The appreciable alteration shown by these figures might indicate a corresponding change in soil erodibility. There is certainly some loss in fertility and capacity to produce soil-binding plant fibres.

The growth of cultivated crops, even of cultivated grasses, does not fully replace the fibre lost with the destruction through cultivation of the original native grasses. In investigations conducted at the Soil Research Laboratory it was found that the rate of decomposition of the roots and crowns of certain forage plants, incorporated in soil for a period of 143 days, showed the following order of percentage decomposition: alfalfa 70.0 per cent; slender wheat grass 76.2 per cent; brome grass 63.0 per cent; crested wheat grass 63.3 per cent; and thread leaved sedge, a native grass, 31.0 per cent. As thread leaved sedge may be considered as typical of native grasses, it is readily seen that the organic matter supplied to soil by cultivated plants is more rapidly decomposed than with native grasses. These data would help to explain in part the difficulty which has been experienced in restoring to prairie land its original resistance to wind erosion.

When it is remembered that crop production on the prairies involves almost exclusively the use of cereals in sequence with summer-fallow, with a more rapid depletion of plant fibre than would be the case with rotations including forage crops, the tendency to increased erodibility with progressively prolonged cultivation seems quite explicable.

During recent periods of drought it was observed that drifting occurred more readily on sands and clays than on loams. Drifting of bare, dry sandy soils is obviously due to lack of coherence between the sand particles, and it not confined to prairie regions. The tendency of prairie clays to drifting and the difference in erodibility clays and loams requires some explanation.

It is a characteristic of clay soils when drying to break into lumps, or aggregates of clay particles, of varying sizes. In Eastern Canada these clay aggregates are usually quite large and difficult to break, even by cultivation. On the prairies, many clay soils, probably because of some factor in their chemical composition, tend to weather down, or "slake", to aggregates of proportions sufficiently minute to predispose them to drifting. Investigations conducted at the Soil Research Laboratory show that drifting occurs most readily with soil particles ranging between 0.05 and 0.15 millimeters (.002 and .006 inches) in diameter, and that many clay soils "slake down" to these proportions. That is, while clay soils of humid regions become lumpy on drying, many prairie clays become quite powdery. This condition explains the occurrence during dry periods of severe drifting on heavy clay areas of the West, as for instance on the Regina clay plains. On the Red River clays of Manitoba the general tendency is to shake down to aggregates somewhat larger than 0.15 millimeters, and soil drifting is not as severe as on the Regina plains and similar clay areas.

The relative resistance of loam soils to wind erosion is due to some extent to the tendency of clay particles to adhere to the larger sand particles, resulting in aggregates somewhat larger than in sand alone or clay alone. Furthermore, the adhesive property of clay mixed with sand and silt in a loam soil promotes on drying the formation of a surface crust which resists the erosive effects of wind.

The above findings on the structural characteristics of prairie soils make it possible, on examination, to predict the relative susceptibility of different soil types to drifting.

On the whole, it would seem that susceptibility to drifting is an inherent characteristic of prairie soils, and that the hazard arising therefrom is increased by the system of crop production to which these soils are adapted. The necessity for constant vigilance against the occurrence of drifting, and of sustained effort to improve control measures, is obvious.

A considerable amount of P.F.R.A. research, combined with field trials, has been directed to soil drifting control. In

## RESEARCH IN PRAIRIE FARM REHABILITATION

this connection wind tunnel tests have shown that a good trash cover on summer fallow will reduce the quantity of soil removed from the surface by a fairly strong wind by as much as 86 per cent, while a reduction of 61 per cent has been effected by tillage practices resembling listing. These and many similar results confirm and explain the efficiency of practices which have proved successful on large-scale field trials.

### *P.F.R.A. Regrassing Investigations*

The work of re-establishing grass cover on abandoned crop land, of improving grazing on rangeland, and of restoring lost organic matter to land under regular crop production, collectively known as "regrassing", has been a major activity of the Experimental Farms in the P.F.R.A. programme. During most of the period of prairie settlement, when extensive areas of native grassland were plowed for cereal production, very little attention was paid to the growing of cultivated grasses. Land which proved unsuitable for crop production was simply abandoned to the slow process of natural regressing. With the

emergencies of severe drought and soil drifting conditions, however, the need for an adequate regressing technique became urgent. To meet this need extensive regressing investigations with few precedents for guidance were initiated under the P.F.R.A. From these investigations, conducted to a large extent in co-operation with farmers, a satisfactory technique of regressing has been developed.

One fortunate circumstance in P.F.R.A. regressing work was the introduction to Western Canada of crested wheat grass. This grass, a native of the dry plains of Russia, was introduced to America in 1898 by the United States Department of Agriculture, and to Canada in 1915 by the University of Saskatchewan. Crested wheat grass is highly resistant to extremes of heat and cold, survives long periods of drought, competes at an advantage with weeds and grows satisfactorily for a long period of years. Its use has contributed markedly to the success of dry-land regressing operations.

Most of the submarginal cropland which was abandoned during the drought years produced a growth of weeds. It has been found that crested wheat grass, seeded

Crested wheat grass. Uniquely adapted to prairie conditions, this grass is effectively used in drift control and soil improvement.





Grazing research. Studies of herbage on rangeland leading to improvement in ranching practices are conducted under the P.F.R.A. by the Experimental Farms.

lightly, in the late fall, in stands of weeds, has been able to establish itself, and in a few years to displace entirely many species of weeds. By this simple procedure, arrived at through experiments, many hundreds of thousands of acres of hitherto useless land have been restored to their natural use for grazing. Large-scale seedings of crested wheat grass have been conducted on community pastures at a cost of less than one dollar per acre, or sufficiently low to render the practice economical for western ranching conditions.

On land subject to persistent soil drifting, regrassing has proved the only satisfactory method of reclamation. On severely drifted areas with no weed growth, it has been necessary to establish some temporary cover of winter rye or barley, to protect the emerging grass against destruction by drifting soil. Once established, crested wheat grass prevents further drifting.

The maintenance and improvement of grazing herbage on prairie rangeland has been studied by the Experimental Farms, notably at the Dominion Range Experi-

ment Station, Manyberries, Alberta, since 1927. Under the P.F.R.A., certain phases of this work have received special attention. Grazing surveys, conducted from the Dominion Experimental Station at Swift Current, Saskatchewan, have been made of over three million acres of representative range areas. Considerable accurate information on the nature and value of grazing herbage in different prairie regions has been secured. Further, through the experience gained in this work, a refined technique of evaluating different types of grassland for livestock production has been evolved. In particular, a combination of methods has been developed for the accurate estimation of the quantity of herbage available for livestock in any given area of rangeland, and of translating this information into terms of meat production per acre. There has also been secured a fund of other information which, combined with the results secured at Manyberries, is leading to greatly improved rangeland production.

Native plant associations reflect in their botanical composition and growth the inherent characteristics of the soil,



as well as the climate of the areas in which they occur. Grazing surveys are therefore complementary to soil surveys in assessing land resources.

A recent development of P.F.R.A. grazing surveys has been the establishment of a number of pasture research areas. The purpose of these areas is to provide means of studying the nature of and changes in the vegetation of certain types of range-land. Part of each area is fenced off to prevent grazing while the remainder is under ordinary grazing. Periodic examinations of both grazed and ungrazed areas is expected to produce information useful in range management.

Investigations on the use and value of grasses and legumes in prairie crop rotations are in progress on the various Dominion Experimental Farms, District Experiment substations, and some reclamation projects, and at the Dominion Forage Crops Laboratory at Saskatoon, Saskatchewan. Projects being conducted under the P.F.R.A. at the Forage Crops Laboratory are directed to the breeding of improved types of forage crops, the determination of the best methods of securing stands of grasses and legumes, and increase of seed stocks.

An interesting phase of plant breeding work at Saskatoon is the attempt being made, by crossing wheat with grasses closely allied to crested wheat grass, to develop a hybrid which will combine a perennial habit of growth with the production of large seeds. Such a species, if sufficiently hardy, would simplify regrassing work by enabling deeper seeding than is possible with the small seeded grasses at present available. Success for this breeding work cannot yet be predicted.

Other breeding and selection projects at the Forage Crops Laboratory include a search for varieties of alfalfa sufficiently hardy to withstand heavy grazing, of alfalfa with running root-stock characteristics for drift control, and of low-coumarin sweet clover which can be grown in farm rotations without causing "melilot taint" of wheat. Progress in each of these and similar projects has been satisfactory.

#### *Other Lines of P.F.R.A. Research*

The foregoing incomplete outline will illustrate the scope and nature of P.F.R.A. research. Limitations of space permit only passing reference to other research projects.

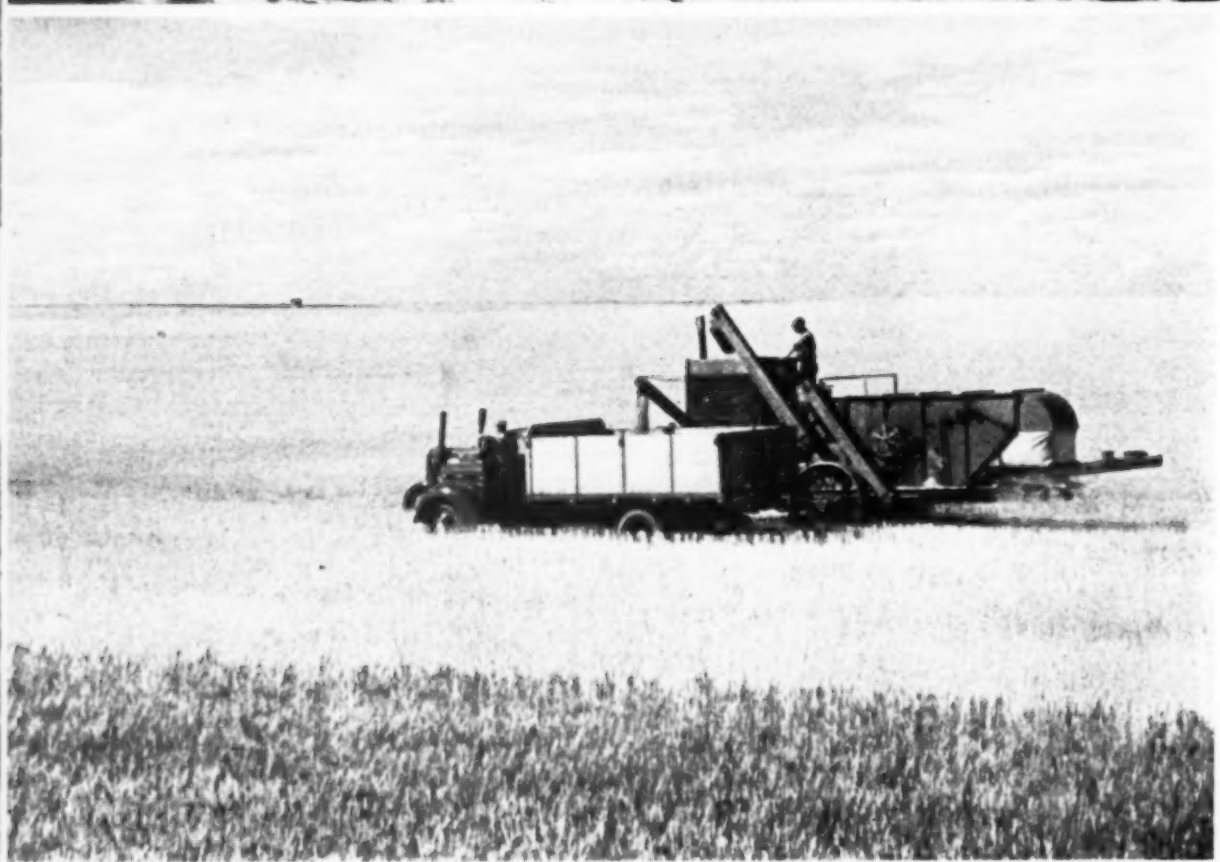
*Tree Planting Investigations:* The provision of free and low cost tree seedlings to prairie farmers is one of the services provided by the Experimental Farms. These supplies are produced and distributed from the Forest Nursery Stations at Indian Head and Sutherland in Saskatchewan. In connection with this work investigations are in progress to determine the effect of tree shelterbelts in checking soil drifting and in promoting soil moisture conservation. This programme includes the establishment of several large-scale shelterbelt plantations, bordering farm fields throughout an area equivalent to one township, in which the effects of tree planting on formerly bare prairie will eventually be fully determined. The larger of these projects are located at Conquest, Saskatchewan, and Lyleton, Manitoba. While growth in these projects, started since 1935, is necessarily slow, some promising indications of beneficial effect have already been observed.

*Sawfly Control:* The ravages in certain prairie districts of the wheat stem sawfly have threatened to force abandonment of the practice of strip cropping with wheat, and thereby to reduce the efficiency of soil drift control measures. Experiments, conducted in co-operation with the Entomological Division, have provided some measures of control and others are being investigated. Briefly, the control of sawflies is effected by growing trap strips of other crops than wheat, in which development of the sawfly larvae is checked, either by early harvesting or by the nature of the crop plant.

*Farm Machinery Investigations:* Drought and resulting soil drifting has created interest in special types of tillage implements which will either promote soil moisture conservation or aid in drift control. P.F.R.A. investigations have shown the limitations of some of these implements. For instance, it has been shown that the damming lister, while useful in drift control, is of doubtful value in moisture conservation. The value of the blade weeder for drift control has been established with certain southwestern regions of the Prairie Provinces.

#### *P.F.R.A. and the War*

While the rehabilitation programme was in no respect intended as a defence measure, it has contributed to some extent to the national war effort. At the outset





Top left:—Soil drifting — a major problem. Dry climate and cereal culture with widespread use of the summer-fallow, render soil drifting a permanent hazard to prairie crop production.

Bottom left:—A sea of wheat. The principal use for good prairie land is to produce cereals. For over fifty years the Dominion Experimental Farms have been engaged in the progressive improvement of prairie agriculture.

Above:—"In the beginning . . ." The Canadian prairies were a vast natural pasture. Prairie land which is unfit for crop production should still be used for grazing.

of the programme the depressed conditions in the world grain markets made it advisable to divert as much as possible of prairie farm production away from wheat to livestock. Hence the establishment of community pasture and other regrassing projects, and extensive associated research. Quite fortuitously, this trend has been of great service in promoting prairie livestock production, so necessary under war conditions. Further, the technique which has

been developed in controlling soil drifting and establishing grass cover on prairie soils has been of great use in connection with the development of military airfields. The undesirability of soil drifting on airfields, especially where such drifting would be promoted by land levelling operations, is obvious. It has been the good fortune of the Experimental Farms, as the result of P.F.R.A. research, to be able to provide expert assistance in preventing drifting and establishing grass cover on a large number of airfields throughout the Prairie Provinces.

In the field of post-war settlement which already is receiving considerable attention, the results of P.F.R.A. research will prove useful. This applies particularly to soil survey and related activities, whereby the formulation and administration of soldier settlement and possible immigration policies in the Prairie Provinces will be facilitated.

Knowledge of the potentialities and limitations of prairie agricultural resources, greater and more exact at this time than formerly, will be invaluable in the coming days of peace.







Work of Gertrude Weir and Molly Carter, Vancouver, British Columbia

## POTTERY IN CANADA

by RUTH M. HOME

THE recent revival of interest in the pottery craft is not an artificial stimulation by a few enthusiasts but merely the removal of strictures on an inhibition and the recognition of a right to a fundamental form of self-expression. This instinct is only part of man's necessity to express his individuality by the work of his hands. Since the monotony of industrialism both in work and output has had a cumulative and frustrating effect, the result has been the rise of handicrafts.

If you look up the word in the dictionary, handicraft is defined as a manual skill, manual art or trade. But obviously that does not go far enough, for in England, in the pottery industry where mass production and uniformity prevail, a great many of the processes are still done manually. The same was true of Japan when it had the monopoly of the very cheap ceramic trade before the war. The definition may be more truly sought in the cause of the rise of handicraft — the need for self-expression by the individual in an age of mass production.

Hence an object may be classed as handicraft when it is the result of a need for self-expression by its creator who personally must carry through all stages the processes of creation. As a corollary it must be distinguished by its character from the manufactured ware.

This definition enables the handicraft potter to avail himself of all modern scientific machines and methods, such as electrically driven wheels, electric and gas kilns and seggar cones, but enforces a repudiation of mass produced material, such as mail-order compositions, and necessitates a certain amount of individual research in glazes and bodies.

A handicraft potter is somewhat like a dentist who may augment his income by employing nurses and sending out his technical work, but may not employ another dentist, so deputizing his contact with his patients, and still be those patients' dentist. So, likewise a potter. He may employ auxiliary help, but the instant the basic processes — such as the chemical blending of glazes and bodies, the designing of mould or shape — escapes his control, then he becomes a mass production potter and ceases to be a handicraft potter.

It is easy to see how the handicraft-potter and the manufacturer-potter may merge. The Susie Cooper pottery is an excellent example of a handicraft pottery that has developed into a manufacturing one. If, after the war, the Medicine Hat Potteries produce along lines that have been tentatively suggested, this may mean the development of a "handicraft" business designed to capture the more lucrative and discriminating trade.

Top left:—Mrs. M. Grute, night-school teacher, instructing a pupil, Victoria, British Columbia.

Bottom left:—Group by Marion McCrea, Vancouver, British Columbia. C.P.R. photos



Animals modelled by Mrs. Burchett, British Columbia

C.P.R. photo.



"Sea Spray, a Fantasy in Glazed Pottery" by Doris Lecoq. Exhibited in London and Glasgow at the Royal Academy

*Coast to Coast*

Having outlined the scope of handicraft pottery, let us now see how it may be integrated into the social life of Canada. But before any co-ordinated and concerted plan may be drawn up, it is wise to summarize the situation, just as a doctor studies the history of the case before he makes his diagnosis.

The art of the Pacific Coast Indian has impressed itself on the pottery from British Columbia. From the early work of Emily Carr, more famous, perhaps, for her paintings than for her pottery, to the more recent work of Marjorie Robertson or Doris Lecoq, there has been a definite attempt to carry on the traditions and spirit of the Indian and the pioneer. With three exceptions most of the working potters have studied in the Vancouver School of Art or under the Victoria Board of Education. In the former, pottery is taught as part of the general four years' course as an elective craft of six hours a week in the second year, and is one of the dominant crafts of eight hours a week in the Diploma Design Course. It is also taught as a special subject for day and night students. The present enrolment is about eighteen. The connection between graduate and school is still maintained because, of the six kilns available in the area, five are owned by the schools.

Charles Beal, the sculptor — is privately owned.

In Saskatchewan, the Worcesters, father and son are the chief workers. Professor Worcester, Senior, is a professor of ceramic engineering at the University of Saskatchewan and has an international reputation in the technical ceramic field. He also employs his leisure time in experimentation with glazes and bodies and has produced many charming results. Exposed to such a clay atmosphere from his early youth, his son naturally specialized in ceramics and owns a pottery, now, unfortunately, closed for the duration.

From Manitoba comes the cry that the East has too great drawing powers. A correspondent writes "The pottery at Steinbach started out to be quite extensive but the demand for potters looked rosier in the East." There is a small group of women, however, who, under the inspiration of a Mrs. Edwards, make lamp bases, book-ends, cups and saucers, jugs, teapots and cigarette boxes which they sell to local stores or gift shops. Mrs. Edwards herself received her training in England, working before her marriage at the University of North Wales, Bangor. She owns her own electric kiln that fires to 2000° F.

One interesting experiment has been made that has potentialities for the future.

Pottery made by students of the Vancouver School of Art under the instruction of Grace W. Melvin.

Courtesy of the school



Yarko Zavi empties his kiln after the final firing.



There is also the individual who occasionally "indulges" and makes a pot under the auspices of a school. Upon the basis of the definition, "handicraft" rightfully includes such sporadic works.

At the same time, it should be made clear that the appellation of "handicraft" to a pot does not make it automatically a work of art or place it on a higher plane than the manufactured ware. The qualification of character exacted by the definition should forbid lazy workmanship and exact a high standard of design and technique.

The inclusion of the sporadic potter in the handicraft family suggests the division of the handicraft potter into two kinds of people, the amateur who plays or recreates in clay, and the professional who derives his living from his work. The first is sometimes a menace to the second as he detracts from the sincerity and sound workmanship of the latter. But not only does he sometimes grow into a professional potter but also, under guidance, his interest will both make a lucrative market for the wares of his professional colleagues and will also raise the standard of ceramic taste in the community.



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Axel Ebring, "the pottery man of Vernon", is perhaps the most colourful personality. He is Swedish by birth and is descended from a long line of potters. Located first at Salmon River, he later moved to Vernon. He throws all his wares, using naturally recurring materials and firing at a temperature high enough to mature a silica glaze. The finished pots are in soft shades of blue-greys and tans.

On the border between Saskatchewan and Alberta lies one of the few good kaolin deposits in Canada. It naturally forms the focal point of ceramic industry in both provinces.

In Alberta the handicraft is taught in the Institute of Technology and Art and in the Western Canada High School in Calgary. In addition, the University of Alberta sponsored a summer school at Banff during which a course was given in ceramics. There are three kilns in the province, of which only one — that of

Charles Beal, the sculptor — is privately owned.

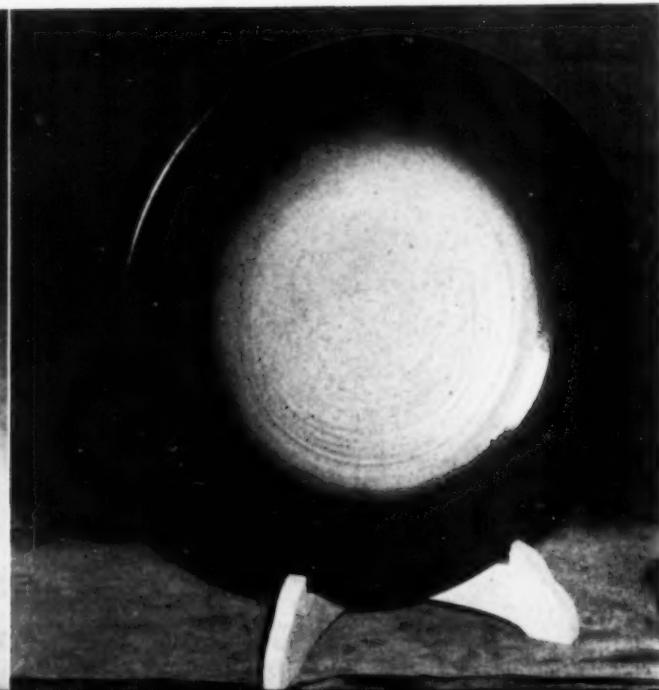
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Nunzia d'Angelo-Zavi at the wheel



Two figures by Dora Wechsler. Exhibition of Canadian Guild of Potters, Toronto, 1943  
 Courtesy of Art Gallery of Toronto

of pottery in the sphere of recreation. Again quoting: "Some of the boys waiting to go overseas have had a good time playing round with clay. None of them had ever seen pottery made before. It surprised me to see the kick they got out of it."

From the mere weight of membership numbers in the Canadian Guild of Potters, the pottery craft would seem to be most popular in Ontario. Of the forty working potters, seven might be classed as professional handicraft potters, though the others all sell varying quantities of their output either privately or through the Canadian Handicrafts Guild's shop at Eaton's and the Women's Art Association.

Not all the members live in Toronto, but there seem to be two centres of work between which the potters shuttle back and forth. The one is the Central Technical School and the other is the Ontario College of Art. Working through the Guild as technical consultant, Mr. Montgomery, the professor of ceramics at the University of Toronto, holds a sort of watching brief over the activities in both places.

The technical school has the distinction of being the first to teach handicraft pottery in Canada. In 1915 it was initiated by Mr. Alfred Howells, who employed a part-time man for the actual



First row—top to bottom:—

Soup bowls by B. Coghill Haworth, jar by Mabel Masters, Ontario. Exhibition of Canadian Handicrafts, Toronto, 1942  
 Courtesy of Canadian Guild of Potters

Work of Gladys Montgomery, Marguerite Baines, and Kathleen Towers. Exhibition of Canadian Guild of Potters, Toronto, 1943

C.P.R. photo

Pottery by Ivy Hamblett. Exhibition of Canadian Handicrafts, Toronto  
 Courtesy of Canadian Guild of Potters

Second row—top to bottom:—

Table service by Kathleen McKim. Exhibition of Canadian Guild of Potters, Toronto, 1943

Work of Bailey Leslie and Thomas J. Mitchell, Ontario. Exhibition of Canadian Guild of Potters, Toronto, 1943

Plate by Ray Carthy. Award of the Canadian Handicraft Guild (Ontario), purchased for the permanent collection. Exhibition of Canadian Guild of Potters, Toronto, 1943

C.P.R. photo

Right—"Barcelona" by Donald Stewart, S.S.C., O.S.A.  
 Courtesy Ontario College of Art



instruction. At present, the attendance is from twenty to twenty-five students in the day-time and about twenty-eight at night. Pottery is an integral part of the four years' course and is taken in the third and fourth years; the time varies from a full day to five hours a week depending on the degree of specialization desired by the student.

At the Ontario College of Art, pottery was started by Mrs. Agar Adamson, who, in the glow of an enthusiasm that has fired her all her life, gave them their first kiln, tools and materials. Here pottery formed a part of the first year course, taking three hours a week, and there was a special pottery class requiring six hours a week.

The majority of the professional potters have received their training in Europe. The others studied at the Central Technical School under Mrs. Peter Haworth. Of these Nunzia d'Angelo, now Mrs. Zavi, has been the most consistent worker, earning her living as a teacher and as a producer. Mrs. Zavi has always been a

crusader in the pottery cause and has furthered its welfare by much good propaganda. She was the moving spirit in the organization of the Canadian Guild of Potters in 1936 and in the early negotiations for the Canadian exhibit at Syracuse. The other members are all enthusiastic potters working both at the Central Technical School and at the Ontario College of Art and produce objects with a high standard of design and of ceramic excellence. They have broken entirely with the curse of "arty-crafte" vases and sculpture and their work, in consequence, compares with the best that is made in the other parts of the continent.

Not only has Quebec the longest pottery history of all the provinces (the first bricks and pots were made there in 1686), but it is also the first province in which pottery has been regarded by the provincial government as a potential source of wealth. Since 1932, the Department of Agriculture has included in its division of handicrafts a well organized and clearly enunciated ceramic programme. Two years before, the Montreal school of Fine Arts sent M. Normandeau, one of its graduates, to study at Sèvres, and, upon his return in 1933, opened a ceramic division at the school. Some of the graduates, such as Louis Parent, William Hutchison and Jacques Spénard, have already made names for themselves in the ceramic world. There is also in the province a small but enthusiastic group of amateur potters who work along the same lines and under the same conditions as in the other provinces.

Under a separate category fall the peasant potters of Beauce — a project launched in 1941 by the Department of Agriculture. In this, sons of farmers are established on small farms of eight to nine acres and are given training in carpentry, drawing, modelling, and pottery.

They make their own houses and furniture, farm during the summer and make pottery in the winter to give them a cash income. In the principle of this plan may be found the solution of the problem of the seasonal worker in both farming and industry.

Hence there are three sorts of workers in the ceramic field in Quebec, the amateur who is similar in economic position, training and ability to his fellow workers in

Mrs. Schofield at the wheel, Victoria, British Columbia  
C.P.R. photo





the other provinces, the professional who seems to be more strongly entrenched and better able to make a living than elsewhere in Canada, and, finally, the rural worker, a potter peculiar to Quebec and who approximates to the peasant potter of Europe.

Pottery in Nova Scotia means Alice Hagen. There are no professional potters in the province but the Department of Education has since 1938 sponsored a summer course for the training of teachers under Mrs. A. Hagen. The course covers a period of three four-weeks' summer courses and leads to a diploma. Mrs. Hagen works in close co-operation with the Nova Scotia College of Art. Local clays are used entirely for the bodies, good clay being found all along the Annapolis Valley from Shubenacadie to Antigonish. The glazes have, until recently, been imported from England, but in 1941-42 they made their own translucent and opaque white. There are ten kilns in the province, some of which are owned by the schools.

The only professional potter and, as far as can be discovered, the only potter, in Prince Edward Island is Mary Allison Doull. One time miniaturist and portrait painter, her interest now seems to be the pottery craft. During the winter she is associated with the New York Society of Ceramic Arts, in the summer she opens her own studio at Cape Traverse. Contrary to the usual habit of potters Miss Doull uses the coil technique. In this simple fashion she turns out a variety of shapes to suit her market.

At St. Andrews, New Brunswick, as part of the stock of the Charlotte County Cottage Craft, Miss G. Helen Mowat sold the products of her own kiln. She employed an experienced English potter who oversaw the technical aspects while Miss Mowat taught the school children to do the decorating. At first she used local clays, but the type of decoration employed necessitated a white body so she brought in clay from the Sovereign Pottery Company, Hamilton. This pottery was only part of the general business, but it paid for itself, and during the years of depression it gave the young people an interest and a hobby.

At "Dykelands", Moss Glen, New Brunswick, are two people who are making a living out of the products of their kiln, Kjeld and Erica Deichmann. A proper perception of the role of handicraft in the modern world, a "feel" for good pottery form, with a sound training in ceramic chemistry and technique, above all the



Mrs. Hagen at work, Nova Scotia

Work of the peasant potter students of Beauce, Quebec  
Courtesy of O. Beniau, Ciné-Photo Service photo





Part of a strawberry service by Kjeld and Erica Deichmann, New Brunswick. Canadian Guild of Potters Exhibition, 1943

Perfume bottle by Kjeld and Erica Deichmann. Award of Canadian Handicraft Guild (Ontario); purchased for the permanent collection. Exhibition of Canadian Guild of Potters, Toronto, 1943



ability to work long hours, has raised their pottery to a position of relative financial security, producing wares with an international reputation. They use a local red brick clay and a grey stoneware clay in a proportion of 60-40. This they fire for bisk at about 1800°F. and for gloss at a temperature varying from 2070°F. to 2300°F. As they rely for their effects entirely on form, colour and texture, they employ a variety of glazes both fritted and raw. All their work is thrown or modelled. The pottery has been in production since 1936-37.

The Deichmanns divide the work between them. Kjeld does the throwing while Erica adds the handles, spouts, etc. She also models the "Goofus", the spirited horse-giraffe that has become the ceramic mascot of the Deichmann pottery. Their ceramic background is brief but concentrated, three years' study in Denmark followed by two to three years' research in the qualities of the clay on their farm. It is the type of apprentice training that could well be initiated on a broader scale in the other provinces.

Such is the summary of the pottery situation in each province. Let us now examine the summary.

The Provincial Governments either through their Department of Agriculture (Quebec) or their Department of Education are nearly all sponsoring ceramics as a handicraft. Comparing the number of professional handicraft potters with the numbers taking the work, the emphasis would seem to be in the training of the amateur. While this is disappointing from the material point of view, yet its effect on the country must not be underestimated. One of the tragedies of the modern trend in education is to think that education is training people for a job, whereas education is really training to live successfully both with yourself and with other people. The training to earn money is only a part of the task of the educationalists. If they ignore the desire to create, a wish aggravated by the monotony of mass production, they are not fulfilling their duty. Nor are they making education the basis for the development of a healthy community. With increasing industrialism boys and girls must be taught the meaning of recreation. Moving pictures, dancing, motor-cars and sports are recreational activities but they do not comprise the whole list.



Goofus or goofi and vase by Kjeld and Erica Deichmann

Courtesy of the Sea Captain's Shop, Toronto

The Winnipeg group recognized this when they gave the soldiers clay to work with. The Muskoka Community Life Projects, classes at settlements, Art Galleries and Museums, Women's Institutes, and small informal groups scattered over Canada are all groping towards an adequate definition for the word "recreation". The various Departments of Education should therefore not cease their sponsorship but rather should see the potentialities of ceramic teaching as a training for adult leisure.

The difficulty in the past has been that the individual has had no place to prolong his manual education. The family do not approve of puddling in clay in the only living-room in the house. That is why a recent development in Toronto is important. Here a house has been set aside by the Department of Education working through the Ontario College of Art, as a work centre not only for pottery but for other crafts. Here adults may recreate in clay, wool or metal to their complete content.

Large jar by Kjeld and Erica Deichmann

Courtesy of the Sea Captain's Shop, Toronto  
C.P.R. photos

Such centres may also attract the younger generation who may have talent, skill and self-discipline enough to change their amateur status to that of a professional potter. It must be recognized that the craft will not mature, that it will remain only a hobby and an escape from boredom so long as it does not attract the enthusiasm, interest and hard working abilities of the younger generation. No matter how good amateur potters are, they smother the possibilities of the craft





Peasant potters of Beauce

Courtesy of O. Bernau. Ciné-Photo Service photo

because they do not have to live by their handiwork and so their prices, their sporadic output and their lack of fundamental seriousness and practicalness defeat their genuine interest in the welfare of the art because it scares away the youngster and irritates the business man.

In all the provinces there are small groups, interested in pottery, belonging to the amateur classification. They have been formed by the initiative of one individual, a Mrs. Agar Adamson, a Mrs. Hagen or a Mrs. Edwards, and there is every sign that they will increase in numbers if given the chance. Such groups have all the strength of their creation, being formed because of their mutual interest, but they have also all the faults of such a birth. They follow too closely the methods and technique of their inaugurators, they lack facilities for more diversified training and their sources of information are limited. This may foster individuality but without a deeply inbred cultural heritage, individuality tends to produce an art craft type of ware.

The Canadian Handicrafts Guild and the Canadian Guild of Potters might be of tremendous value in solving these difficulties of the small group, for where the Potters' Guild has been effective, it has already proved its value in raising the standard of workmanship among its members. The aims of the Guild are to demand a high level of craftsmanship, to stimulate research, foster individuality by emphasizing the use of local clays, and to act as an information and organization centre for the numerous groups previously mentioned.

Another interesting finding of the survey has been the number of European trained potters now established in Canada. While the Canadian-born potters may have enthusiasm and skill, the European has the tremendous advantage of a heritage that no amount of acquired art can overcome. It is one of the tragic mistakes of the powers-that-be that many of the foreign ceramists have been forced into other lines of work by their indifference and inertia. Given an opportunity, these refugees could



contribute so much to the enrichment of Canadian life and economy.

In numbers, the professional potters seem to be far too few considering the years ceramic training has been given in the schools. Larger salaries offered in other work, the lure of the United States, lack of capital, competition with the European product, superficiality of training and absence of a discriminating public — all these factors may have helped in keeping the numbers down. But the major cause has been, perhaps, the confusion between training for leisure and training for a trade. So many have taken the courses offered by the schools purely as a recreational activity or as a part of their general art background that few regarded pottery seriously as a life occupation. The solution is obvious. The student must realize why he is taking the course in pottery; the teacher must realize that his teaching is not preponderantly cultural.

Finally, out of the Beauce project in Quebec, may come the answer to the

financial problems of the subsistence farmer, fisherman or marginal labourer, of the man who does not make quite enough to pay for the essentials but who might augment his income during his leisure hours. Hooked rugs in Quebec and candlewick bedspreads in the mountains of Virginia have played such a part in the economy of the communities. But the women were already making these; all that was needed was a central organization and a market to stimulate production. In pottery, there are no domestic kilns nor wheels in rural or industrial Canada; the craft does not permeate the life of any community; the worker does not voluntarily turn to a potter's wheel during his leisure; hence the situation is slightly different. In addition there are the technical problems involved and the initial expense of local kilns and wheels, should the fostering of such a craft be considered by a community. But with intelligent long term planning, pottery could become an important subsistence craft.

Exhibition of the Canadian Guild of Potters, 1941

Courtesy of Canadian Guild of Potters





A black widow spider in close proximity to her three egg sacs. Her bite has caused much suffering, and she should be shunned at all times, and, if seen, killed with a stick held at arm's length.

## BLACK WIDOW: THE WORLD'S MOST DANGEROUS SPIDER

by RAYMOND W. THORP and WELDON D. WOODSON

THE most feared spiders in all the world are those which belong to the genus *Latrodectus*. Species inhabit each of the six continents, and they have the universal reputation of inflicting bites upon human beings which result in excruciating pain.

The Canadian species is *Latrodectus mactans*, or, to use its common name, black widow spider. Reports told of her presence in British Columbia as early as 1934. The publicity that attended her discovery enabled the public to recognize her. She subsequently has been reported in Alberta, Manitoba, Ontario, and other parts of Canada. Many persons consider her with horrible fright, and most every one is vitally interested in how her numbers may be controlled and what constitutes the best treatment for her bite.

*Latrodectus mactans*, the Canadian species, is also found throughout the United States. This spider has been reported in each of the forty-eight states, and scores of case histories of victims of her bite have been reported by physicians. The Indian tribes of earlier days definitely referred to the black widow spider. According to the authorities, Chamberlain and Ivie, some of the Utah Indians (the Gosiutes) mixed the macerated bodies of black widow spiders with liver already impregnated with the poison of the rattlesnake. With this concoction they prepared their poisoned arrowheads. The historian, Dr. C. Hart Merriam, stated that the Californian Indians (the northern Mewuk) knew *Latrodectus mactans* as Po-ko-moo. This tribe referred to "the small black

spider with a red spot under his belly", and asserted that "he scratches people with his long fingers, and the scratch makes a bad sore". The above Indians also used black widow poison on their arrowheads by crushing entire spiders and dipping the arrow-points in the mixture.

Further to the southward, in Mexico, *Latrodectus* is familiar to the people of that country, who look upon the creature with awe and fear. One species is termed *arana capulina*, "the cherry spider", and is known to the Indians of the mountainous interior as "chintatlahu". The species is represented in the West Indies by a spider known colloquially as "cul rouge". Science recognizes two species in these islands—*Latrodectus curacaviensis* and *L. geometricus*. In Central America the species mentioned in spider literature as "cassampulga" or "pallu" is to be found. There are numerous legends both in the islands and in Central America concerning the black widow, and evidence has been collected to show that they are usually founded upon fact. In both areas *Latrodectus* has been studied from both arachnological and clinical viewpoints.

*Latrodectus* is well represented in South America. Species are commonly known in Brazil, Argentina, Chile, Bolivia, Uruguay and Peru; actually from the roof of the continent southward to Tierra del Fuego. In these warm countries the native population lives in fear of the black widow, which they have enveloped with superstition. Various scientific titles have been bestowed upon the many species involved, and these include *L. formidabilis*, *L. Peruvian*, *L. cura caviensis*, *malmignatus*, *variegatus* and *thoracicus*. The popular names include *cassampulga*, *araignée rouge*, and *mico*. In Argentina and Uruguay the spider is usually spoken of as *arana del lino* (*araignée du lin*); in Chile, *arana brava* (*araignée dangereuse*), *guina*, and *pallu*;

in Peru, *luccacha*, in Venezuela, *arana naranja*; and in the Antilles, *cul rouge* and *heures*.

This global menace is scattered thoroughly throughout Europe. In Greece there is *L. conglobatus*, and in Italy *La malmignatte*, which is also known as *L. tridecemguttatus* and *L. 13-Guttatus*. This latter appellation is derived from the fact that there is on the underside of this species thirteen triangular or half-moon shaped spots. Many reports substantiate the general opinion that this same species caused the virulent epidemics which took place in Spain from 1833 to 1841. This species has also been responsible for disasters to humanity in France, Corsica, Tuscany and Sardinia. In the latter country, great epidemics occurred in 1833, and again in 1839, when large numbers of people, as well as live stock, were bitten by this black widow spider. In southern Russia, the black widow is prevalent. Known to science as *L. lugubris*, and to the general public as *karakurt* (black wolf), this species has been the subject of special studies by Russia's foremost scientists.

South Africa shares in providing a haven for three species of spiders belonging to the genus *Latrodectus*: *L. geometricus*, *L. concinnus*, and *L. indistinctus*. The

In destroying a black widow spider, one should squash it with a stick held at arm's length. Likewise the egg sacs should be squashed, and at a single blow. On such forays it is well to wear white. The above is in the interior of a garage, where rubbish has been allowed to clutter.

Photo by Keith Boyd



most popularly recognized species goes by the colloquialism of "knoppie spinnekop", which translated into English means "the shoe button spider". Peculiarly enough, the Canadian species of *Latrodectus* is sometimes described as "the shoe button spider". Particular mention is made in spider literature of the species inhabiting the island of Madagascar, which is indicated under the dual names of *mena-vodi* and *vancoho*. Violent dancing is the specified treatment which prevails in the island for this spider's bite.

Russian Central Asia furnishes the species *L. lugubris* and another called the "redback" or "jockey" spider. This species ranges from Arabia through southern Asia to the Malay Archipelago and Australia. The New Zealand spider is identified under several scientific names, including *L. hasseltii* and *L. scelio*, but is known to the natives as "katipo" or "night stinger".

One common denominator of *Latrodectus* species the world over is the similarity in symptoms of the widespread victims. These are also similar in their appearance, type of nest spun, and life habits. A description of one serves for all, and a good example is the Canadian species: *Latrodectus mactans* or, as it is better known, the black widow spider.

This spider possesses long, black, wiry legs which when stretched to their full length give it a spread of as much as an inch and a half. Its fore section is tiny and its hind part, especially when filled with eggs, bulges upward noticeably. The spider has the appearance of baldness, but an inspection by means of the hand lens reveals a coat of minute hairs. Its colour

is glossy black, except that there may be a red, orange, or yellow hourglass design on the underside of its abdomen.

The male black widow spider contrasts with the female in that he owns but little venom, and of a potency just sufficient to subdue the smallest insects. His length ranges from a third to slightly more than half that of his spouse's. His colour scheme is generally cream, with four, brownish, vertical stripes running along the side of his abdomen, a dark band down the middle of the frontal portion of his body, and another along the centre of his back. The belief is widespread that after the nuptials the female invariably eats the male. But she does so only when in great hunger, and often permits him to go his way and live out the several weeks which comprise the remainder of his natural life. The misconception that she is a husband-head huntress nevertheless has caused man to label her the black widow spider.

The black widow spider's nest can readily be identified. She spins a coarse, criss-cross web which quickly becomes dirty and which may be found in darkened corners of garages, basements, and attics. Investigations reveal that she may construct her web in just about any location convenient to attach it. She has been discovered in Canada in closets, cellars, out-houses, and amongst numerous other man-made structures; in eroded granite, bundles of fodder, stacks of hay, bushes, clumps of grass, newly cleared ground and the uncultivated earth at fence corners; and in the sleeve of a work shirt, underneath the seat of a rocking chair, and in other unique retreats.

The nature of her food has been determined by noting the carcasses which lie within her web, or on the surface below it. This spider quells a victim by swathing it with viscid silk, or nipping it with her fangs. At her leisure she sucks out the life juices and leaves only the "husk".

Black widow spiders construct coarse, criss-cross webs with no apparent design under houses and in darkened corners of garages, attics and basements and also in any place convenient to attach her web.

Photo by Keith Boyd





A black widow spider clinging to her web. Its bite may result in severe, excruciating pain.

Photo by Keith Boyd

Observers report that in Canada species of beetles, moths, flies and numerous other insects have served as her victuals. This supports the conclusion that her diet is a "come-what-may" menu. But a shortage of rations does not hamper her, for she can go as much as four consecutive months without food.

To decipher her complete life cycle has necessitated specimens to be reared in the laboratory and observations to be made frequently. It is now known that the fertilized eggs resulting from mating quickly develop within the female's body, and her abdomen takes on a swollen appearance. She deposits them in a web framework shaped like a cup, emits silk from her spinnerets, and works the strands with her hind legs around the mass. There is thus formed the egg sac (or cocoon), which in size about equals that of the tip of the index finger, and contains on an average 300 or so eggs. The embryonic young will shortly work an opening into one end of the cocoon and file out singly. The time needed for a female to grow from an egg to an adult depends partly on environmental factors, but three or four months will elapse under the most optimum conditions of food, temperature and humidity. Artificial rearing of broods have revealed that the life span of a female black widow spider averages twelve to fourteen months. She may during this period mother five or six hatches of young.

Scientists for the last seven or eight years have been attempting to work out a means to control black widow spiders. Manifold fumigants, sprays, and other preparations have been tried, but none proved worthy of recommendation. It is advisable, however, to remove all rubbish and similar materials in which this spider might take up her residence. A flashlight is expedient in garages, under houses, in attics and other places where there is a lack of sunshine. It is also wise to wear white clothing, with the bottom of the trousers tucked in boots (or clasped with rubber bands) and the collar fastened tight, which arrangement would enable



one to see the spider should it peradventure drop upon him. The best method to kill these spiders is to take a fly swatter, shoe, broom, stick or similar weapon and thoroughly crush them. A person should kill it at arm's length and be careful lest he brush against strands of web and dislocate the creature. One should, furthermore, squash the egg sacs and thereby at a single blow destroy several hundred potential adult female black widow spiders.

Investigators have sought at length to discover the natural enemy of the black widow spider. Sundry creatures have been signalled out, such as a species of lizard (*Gerrhonotus multicarinatus uebit*), a small parasitic fly (*Gaurax araneae* Coquillett, *Pseudo-gaurax signata* Loew), a tiny wasp belonging to the family *Scelionidae* (*Baeus Californicus* Pierce), and a score of others. They have shown their effectiveness to destroy these spiders in varying degrees, but none to the extent that it could be heralded as the natural enemy of the black widow spider.

A species of mud-dauber (*Chalybion cyaneum*) has received very favourable recognition. Examinations of the mud nests have revealed a series of tunnels and catacombs in which are stored the bodies of scores of black widow spiders. The



Showing the under side of a black widow spider (a dead one). Note its coal, black colour, its eight, wiry legs and the hour-glass design on its abdomen.



The black widow spider of Canada (*Latrodectus mactans*), belly upwards, incubating its three egg sacs.

spiders are stung into a state of inertia by the wasps, and enclosed in the mud-houses along with the eggs of the owners. When the young mud-daubers are born (hatched from eggs) they find within easy reach this vast storehouse of provender. It is the tidy housewife who, with her broom as a weapon, has destroyed millions of mud-wasp nests because of their unsightliness. Unwittingly, she helped propagate black widow spiders.

Their numbers cannot be entirely exterminated, however, and there will always be the ever-present danger of a person being bitten. A question that has bewildered many is why some have been bitten by the black widow spider and experienced no ill effects, and others severe pain. There is a satisfactory answer. The black widow's poison sacs are surrounded by striated muscles which operate at the will of the spider. In one instance she may inject her fangs into an individual but secrete no poison; in another only a tiny portion of the poison content, and yet in another the maximum. The venom is forced through the hollow fangs, out of a tiny opening near their tips, and into the wound made by the fang-points. Her poison supply is much less than that of the rattlesnake's, but it nevertheless is of import that one series of laboratory experiments showed that her venom (drop for drop) is fifteen times more potent than that of the prairie rattler's.

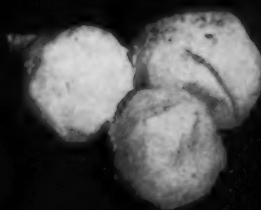
The best way to determine whether one has been bitten by the black widow spider is to witness the creature in the act. But she is seldom seen at the moment of the

bite, and the fang pricks left are tiny and hardly discernible with the naked eye. Thus the course left is to compare the symptoms of the patient with those manifested by known victims of *Latrodectus mactans*. At the moment of the injection of the fangs there is usually a mild, burning sensation likened unto a sharp pin prick which lasts for a few minutes. The effects spread by continuity. In a typical case of a person who is bitten upon the palm of the hand, the pain will travel upward to the elbow, then to the shoulder area, and down the trunk of the body toward the kidneys, following which the abdomen becomes rigid. Other frequent symptoms include cold perspiration, nausea, vomiting, insomnia, muscle twitching and delirium. The venom possesses neurotoxic properties and has a particular affinity for the nerves. It is unlike rattlesnake venom in that it does not affect the blood or blood vessels, and the application of the tourniquet is therefore useless in treating spider-bite patients. The most dominant symptom is the pain, which may be felt throughout the body. One report describes the pain as not unlike huge tidal waves, with the whole body—as in a severe case of influenza—groaning with the so-called muscle and bone aches. So excruciating is it that the spider-bite patients roll and toss and moan, and some reports speak of them threatening to commit suicide.

More than ninety different remedies have been used as treatment for black widow spider-bite. A few of these have been helpful, but on the whole they have



The black widow spider when in danger pretends that she is dead. A person should be aware of this subterfuge and be ever on his guard.



Triumvirate of black widow spider egg sacs, each of which may contain several hundred eggs. Within 14 to 30 days these are hatched, and they become the tiny, cream-coloured, inchoate creatures that shortly afterwards break out at the pointed end of the cocoon.

been fairly useless, and in some instances decidedly harmful. Dr. H. M. Ginsburg and staff of the General Hospital of Fresno County, California, however, have worked out a regimen that will give good results in most cases. It consists of:

1. The patient is immediately put to bed and iodine is applied to the site of the bite. Absolute bed rest for twenty-four hours is necessary.

2. A soap-suds enema is administered, and non-alcoholic fluids are given freely via the mouth.

3. Morphine sulphate, grain one-quarter, is administered hypodermically to control the pain, and sodium amytal, grains iii, to insure rest.

4. Magnesium sulphate, a 20 cubic centimeter ampoule of 10 per cent solution, is given intravenously, to be repeated as required to overcome hypertension and the spasticity of the muscles.

5. Glucose, 10 per cent, is administered intravenously if the patient's condition requires it.

Dr. Emil Bogen (until recently of the Olive View Sanatorium, Olive View, California, but formerly of the Los Angeles County General Hospital, Los Angeles), writes favourably of the calcium treatment for arachnidism (spider-bite), which was developed by Stewart and Gilbert. This

consists of the intravenous injection of 10 c.c. of 10 per cent calcium chloride or gluconate. He also tells that in July of 1925 the use of human convalescent serum in the treatment of spider-bite was first tried at the Los Angeles County General Hospital. Mulford Biologixal Laboratories of Sharp and Dohme have developed a dehydrated serum in lyophilized form (spider antivenin). Several favourable reports have been received following its use.

So if you are bitten by a black widow spider, obtain the services of a doctor familiar with black widow spider-bite treatment, and at once.



Three black widow spiders, belly upwards. Note the creature on the right which has a swollen abdomen, indicating that it is filled with eggs.



Burrard Inlet, Vancouver, British Columbia, at the Narrows, as seen from Prospect Point some years ago. Khay-tulk lived at Chaythoos or High Bank, Prospect Point.

Leonard Frank photo

## THE KITSILANO MASKS

by MRS. W. GARLAND FOSTER

THE Squamish tribe of the Salish nation, in common with other Indian tribes, used masks in their celebrations. As August Jack Khahtsahlano expresses it: "White man may not wear masks, but he does the same things. He wears robes covered with gold embroidery; he uses canopies, carries staffs, even a mace at times; it's all the same thing — all forms, ceremony!" So members of these ancient Indian lodges attended births, deaths, and marriages decked in their official badges of office.

The Khahtsahlano masks are interesting for their artistic development, but also because they belong to a Squamish family from whom the name of Kitsilano, a

suburb of Vancouver, B.C., is derived. The name was much simplified before taking its place in our civic nomenclature, but the fact remains that, as long as the name persists, the Indian chief who first bore it has a memorial.

These masks have only recently been brought to light and photographed through the efforts of the City Archivist, who has had a friendship of long standing with the great grandson of the first chief. Owing to the fear that they might be destroyed because of their supposed idolatrous nature, they have been jealously guarded by their various owners. It is not often that three generations of masks are thus to be



found together. Among the northern tribes, particularly the Tsimshians, totem poles of one chief were destroyed when another took office. Or, in some cases, other insignia were added for the new chief. But masks, being more or less movable property, had no such permanence as totem poles.

The oldest mask in this collection belonged to the great grandfather of the present owner. He was called Chief Khahtsahlanogh and lived up the Squamish River at a place called, in Squamish, Tooktpaak-mik. From this point his two sons moved to Burrard Inlet; here Chief George settled on False Creek, then called Snaug, where he was living at the time the white settlers began to take an interest in this place.

The old chief's mask is shown against an apron of modern cutwork and embroidery, the same shape as the original which dropped to pieces from age. The original cloth was probably made of fibre woven by the women of the tribe. Sometimes the fur of the chipmunk was applied or the feathers of birds were used. When the latter were added, they had to be applied in the vertical manner, never across. The two upright feathers decorating this mask are from the tail of an eagle found high up in the Rockies, but rarely seen on the coast. They were always prized by Indians, and may be seen in the elaborate costumes of some of the Plains Indians. On either side of the feathers are the beaks of two eagles. The whirl of white between these represents the revolving world (a modern conception, no doubt). The checkered black and white markings are for daylight and dark; the wooden eyes protrude about three inches. The mask itself is made of the very tough vine maple wood, although cedar is used for the others.

The other son of the old chief, an imposing figure six feet three in height,

settled in what is now Stanley Park. He was also called Chief Khahtsahlanogh. His mask varies in originality from that of his father's. In place of the two upright feathers there are two plumes, made up of many small feathers, fastened to two long removable wooden pegs inserted in the top of the mask. The feathers are multi-coloured, presenting a gorgeous appearance in their yellow, red, blue, black and white. Originally the feathers were blood red in colour, but the few of these preserved are faded to cerise. The feathers in the new plumes were purchased in Victoria as late as thirty years ago, so no doubt are dyed with aniline dyes. On either side of these are two eagle heads with beaks, while on the forehead of the mask appear two leaves with a broad line between them. The leaves signify death, and two angular designs on the outer sides indicate marriage. The eyes in this mask also protrude. The beak resembles the bill of the Canada goose rather than that of the eagle. In front of it is a carved recess, and under the eyes is a horizontal band of dark colour signifying



Old Chief Khahtsahlanogh's mask  
Courtesy City Archives, Vancouver

## THE KITSILANO MASKS

birth. Below the beak are the final black and white checks which mean daylight and darkness as in the other. There are no openings for eyes in Indian masks, but only a breathing space near the mouth, through which the wearer can peek if he wishes to see.

Chief Khahtsahlanogh's son, known as Khay-tulk, was not a chief, but nevertheless had a mask of his own in addition to those he had inherited from his father and grandfather. His mask is similar to that of his father, but the carving is more ornamental and the addition of waving plumes makes it more elaborate. It would appear that the insignia of the former mask have become more conventionalized. The leaves joined, the angular motifs of the marriage symbols are now question marks or flourishes. Darkness and daylight checkered symbols have become more numerous. Four white markings on eyebrows mean the earth. At the back of the two upright plumes is a bundle of dried folded reeds tightly bound together, into which are inserted thirteen long flexible swaying rods

tipped with the fluffy white down taken from beneath the tail of the wild goose. Down played a large part in Indian symbolism among many tribes. Some of the Plains Indians used it in their war celebrations. Before a feast of the Haidas the scattering of down was held sacred, equally binding on those who gave and those who received. Guests, for this reason, wore on their masks the spines of the sea urchin. Entering the festal long house, the down sprinkled by the host was caught on these spines forming a sort of halo over the mask.

Khay-tulk's story brings the masks down to the first contacts with the white settlers, for he lived at Chaythoos, or High Bank, that is, Prospect Point at First Narrows, Stanley Park, as it was afterwards called. His house was an old Indian lodge built with cedar slabs made by the Indians with stone hammers and stone chisels. Khay-tulk seems to have been friendly with his new neighbours, for he received as a present from the Royal Engineers, then in charge of this area, a cow and a bull calf. From this stock he built up a herd which supplied milk to the first settlers at Hastings Mill farther along the Inlet. The descendants of this herd roamed the park for many years after the owner's death, until in fact they were deemed dangerous to people and were destroyed. It was one of these animals which cut off Khay-tulk's career while he was yet a young man; he died in 1876, as a result of being kicked by one of these cows. His son, the present August Jack Khahtsahlanogh, was born the day of his burial. The remains of Khay-tulk's tomb were still at Chaythoos when, in October 1889, Lord Stanley dedicated Stanley Park to the use of the people; the body had been wrapped and placed in a canoe which was put in a wooden mausoleum raised on four short posts.



Chief Khahtsahlanogh's mask

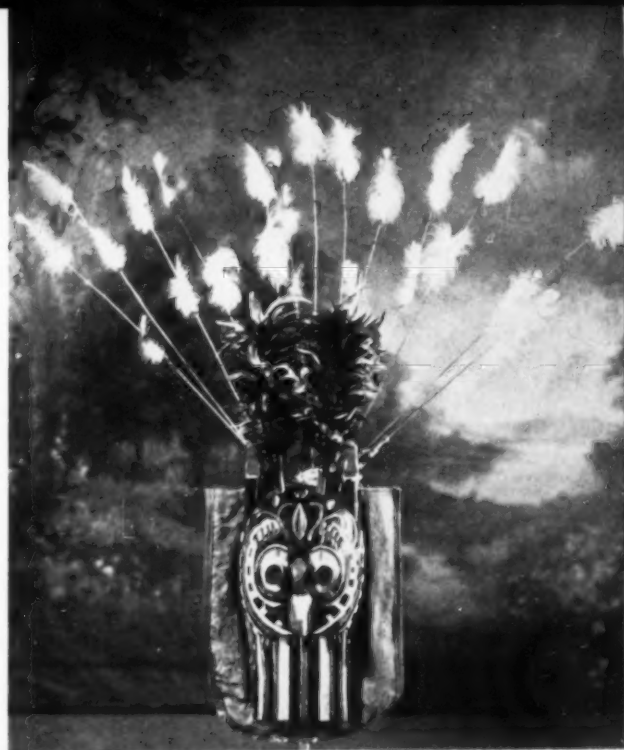
Khay-tulk's mask

After Khay-tulk's death his widow married Chinalset, or Jericho Charlie, and it is owing to him that the masks of the Khahtsahlanogh family have been preserved. He always impressed upon his stepson the importance of saving these mementoes of his ancestors. This stepson, the present August Jack, although not a chief, was also named Khahtsahlano at a special potlatch called for the purpose, held at Snauq, the vanished False Creek village where his uncle lived. Although not a chief, and falling two inches short of attaining his father's height, August Jack is really the important man of his family; he has accumulated a very considerable amount of knowledge concerning the past history of his people and his part of the country. He and his retiring wife, Swanamia, still live at Capilano, opposite his birthplace, just under the shadow the Lions of Vancouver.

When the question came up of a name for the new suburb some years ago, the name of the Khahtsahlanogh family seemed suitable; Khatso or Keatsie means lakes, and Hlano, people, and so, the place was called Kitsilano.

As August Jack has no mask of his own, he is pictured wearing the grandest of the old-time ones, that of his father. The shawl and tunic had to be modern as there is little of the old fibre or tula cloth to be had; the white feathers of the girdle are goose feathers, and he carries a rattle of shells, probably limpet, which came from the west coast near Alberni. The Indian chief must carry his rattle to make a noise when he is dressed for a potlatch. With some tribes, rattles are chiefly seen carried by medicine men, and according to legend they were not made by human hands.

Khay-tulk's mask, worn by his son  
Photos courtesy City Archives, Vancouver









The central square of Trujillo around which the town is laid out.

## CHANCHAN—THE HOME OF THE GREAT CHIMU

by HOPE RANSLOW BENNETT

THE boat anchors outside Salaverry, port for Trujillo. On the shore there is a pier and a little huddle of shanties. True, this is a modern Peruvian town, yet to those eyes accustomed to the clean white clapboards of an American village, Salaverry seems a trifle ghost-like — its houses made from boards salvaged at sea, weatherbeaten and old, a town neither familiar nor foreign, but a strange mixture like so much of the coast of Peru, where native has met alien and the fusion has never been quite complete.

If the weather is fine, you can climb from the tug which takes you ashore up onto the ladder and thence to the pier. But when the waves ride high, there is lowered a wooden chair affixed to a heavy

iron ring. You are slung far out over the sea and up, as the rusty derrick creaks, and you heave a sigh that at last you are on dry land. There are autos to take you up a modern highway to Trujillo, a colonial town, laid out in even blocks by Pizarro in 1534 and named for his home in Spain. The plaza is filled with flower beds, and on one side is the cathedral of Carmen with its four theatrical altars. Of a Sunday evening after the "vermouth hour" at the movies, the sidewalks are crowded with carefully dressed ladies and their escorts, and you realize that the town boasts an aristocracy.

On other days you will see little of this society for the fine ladies seldom appear on the streets. You may walk along peeking

Left:—El Carmen Church, Trujillo, Peru, built in 1535.

Except where otherwise credited, photos courtesy The American Museum of Natural History, New York



Trujillo presents a mixture of colonial Spain and modern Peru, as seen in this general view from the central square.

Grace Line photo

through iron gates into patios beyond which there is life. You may gaze up onto a carved balcony where a *senorita* is parting the curtains ever so little behind the latticed window. But the sidewalks are filled with mestizos, with Japanese and Chinese merchants, with Negroes and Indians. An old woman is frying doughnuts over a curbstome fire, and there are stands where apples and the exotic *chiramoyas*, juicy pineapples and soft, ripe alligator pears are to be had for a penny.

The archaeologist is interested in Trujillo, yes, for it is here that he must set up his living quarters. But his real business is not with those contemporary souls in the modern city but rather with the former coast people who chose a different site for their dwellings, people who came before the Spaniards, who lived before the Incas. So he continues out past the town, where dirty little adobe huts take the place of the Spanish residences. They are hidden, sometimes, behind the tall, beautiful shade of the *fica* trees — little white and blue and pink houses with one room and no bath — homes of curious,

dark-eyed, dusky people who watch him as he passes by, lazily musing over the new treasure hunter. For it is impossible that he is not thinking of gold on his way to Chanchan, and there are few in Trujillo who would sympathize with any plans he might have for the surveying, measuring, mapping of monuments. To them, the archaeological technique would be merely a shallow pretext for diverting their attention from his real search for the "Peje Grande". Chanchan like every other ruin on the coast has its story of treasure.

Many, many years ago — so the legend runs — a priest came from Spain to the City of Toledo, which is part of Chanchan. He helped out a certain Indian in distress and in return the Indian promised him great riches. First he showed him the hiding place of the "Peje Chico" or "little fish", as the treasure was called. This comprised so much wealth that the priest, in blind excitement, rushed back to Spain to spend it. When he returned, the old Indian was dead. That is why the secret of the "Peje Grande", or "big

fish" was forever lost and why to this day the Peruvian is ever lured on by dreams of fabulous wealth in store for him who uncovers the great treasure hidden there.

Yet, as the archaeologist hurries out of the pleasant little colonial town, over the cobblestones, past the sun-baked adobe huts into the open, he is not thinking particularly of treasure, nor of the modern scene around him, except as he half-consciously makes a mental note of the lay of the land, the direction in which he is going, the dry dusty atmosphere which filled the nasal passages of the ancient Chimus even as it does his.

It is natural for him always to conceive of Peru in terms of the glories of its past. He has not perhaps transferred himself, like the romantic story teller, completely into the dim shadowy background of long ago; for his work is with the dirt of Chanchan as it is to-day. But he does hope for a place to dig, a location spot where he will find not only bits of broken pottery, but also fine tapestries — that he may study the weaving and ornamented vases that he may verify the stories of the Chimu people.

Then Chanchan looms against the hot sky. There in front of him is eleven square miles of adobe, a chaos of crumbling walls, but a length and breadth of chaos which he has never imagined. The mighty walls rise yet, some to a height of thirty or forty feet. Pyramids break the even line of the horizon with dull adobe. The city is silent now, silent and grey and dusty, but still it stands impressive in its very magnitude.

There is more to Chanchan than chaos, and to the trained eye of the archaeologist, little by little the city which once housed an estimated 200,000 people takes form. There are different departments in the plan, each laid out with precision and care, each with its temples, its gardens, its homes. True, the corners are now smoothed down, the pyramids look like tired old mountains and the gardens are filled with rubble, yet there is a grandeur and a haughtiness which seems to withstand all the rains and the earthquakes to which it has been subjected.

But it is not only the weather which is to blame for Chanchan's ruins. Gaping holes in the earth, mounds of uprooted bones tell of the treasure seekers' visits.

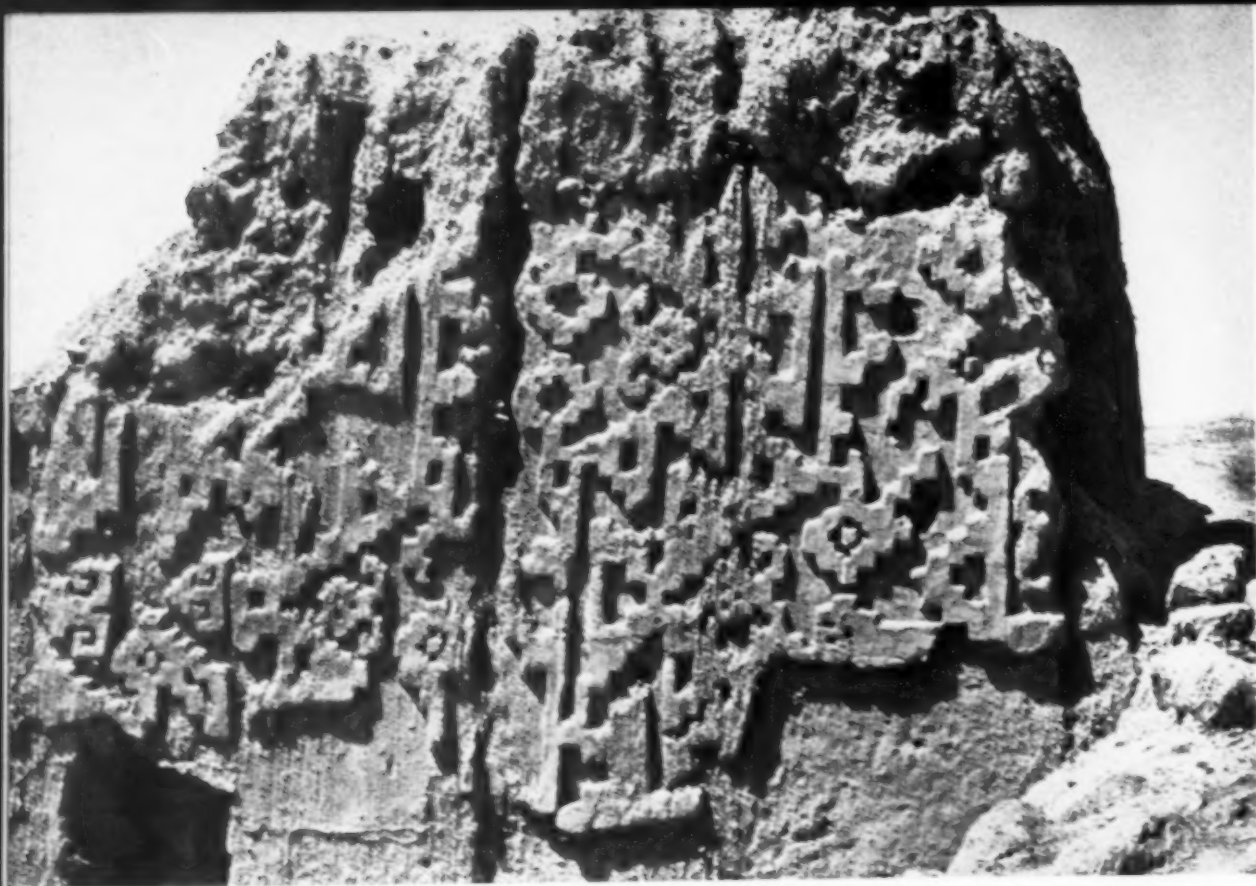
Hollow-eyed skulls lie hither and yon awaiting the little Indian boys who use them for "futbols". Bits of cloth and scattered pieces of pottery are everywhere, while the earth yawns with opened graves. Modern Peruvians have little sympathy for their ancestors and less understanding. In their hysterical searching for gold, they have torn apart precious archaeological finds with a heedlessness which brings tears of exasperation to the eyes of the scientists who follow them.

Two Indians pass the archaeologist, carrying, slung over their shoulders, a couple of dirty shirts filled with loot. They may have laboured days to find what they will be able to sell for a few centavos. They are chewing their *coca* vigorously, and in their hands are the *baquetas* or rods which they have been using to poke for treasure. There seems nothing for the scientist to do, but to forsake his professional training and set out as do the *huaqueros* to poke among *huacas* for *huacos*.

And with that, three of the most important words in all Peru are introduced — words which are not Spanish but Quechua, the ancient Indian tongue which Peruvian natives still speak to-day. A *huaca* pronounced "waka" is any great mound of adobe which was once a construction of some sort, house site, church or monument to a god. Chanchan is made up of *huacas* and all through the valley of Chicama, all up and down the coast these *huacas* are to be seen, structures left by the ancient Peruvians.

A *huaco* is merely an ancient piece of pottery found in or around a *huaca*, and lastly a *huaquero* is he who seeks the *huacos* — the digger who seldom keeps his booty but sells it to the tourist or shop-keeper to be resold many times at a few hundred per cent profit.

The archaeologist therefore assembles his troop of *huaqueros* and they clamber into the old Ford in the early morning hours. The air is cool now and fresh, but the little gnats suspended in the dewy atmosphere bite and draw blood, and the bite swells to enormous proportions — especially if the insect has happened upon eyelid or lip. The *huaqueros* have their *baquetas* and their shovels, but the procession is delayed since they have not yet purchased their *coca* for the day.



Eroded clay arabesque at the ruins of Chanchan. The textile-pattern design is composed of interlocked pelicans. Fish and birds in diamond-pattern areas decorate a well preserved wall of the ruins at Quinta Esmeralda, near Trujillo.

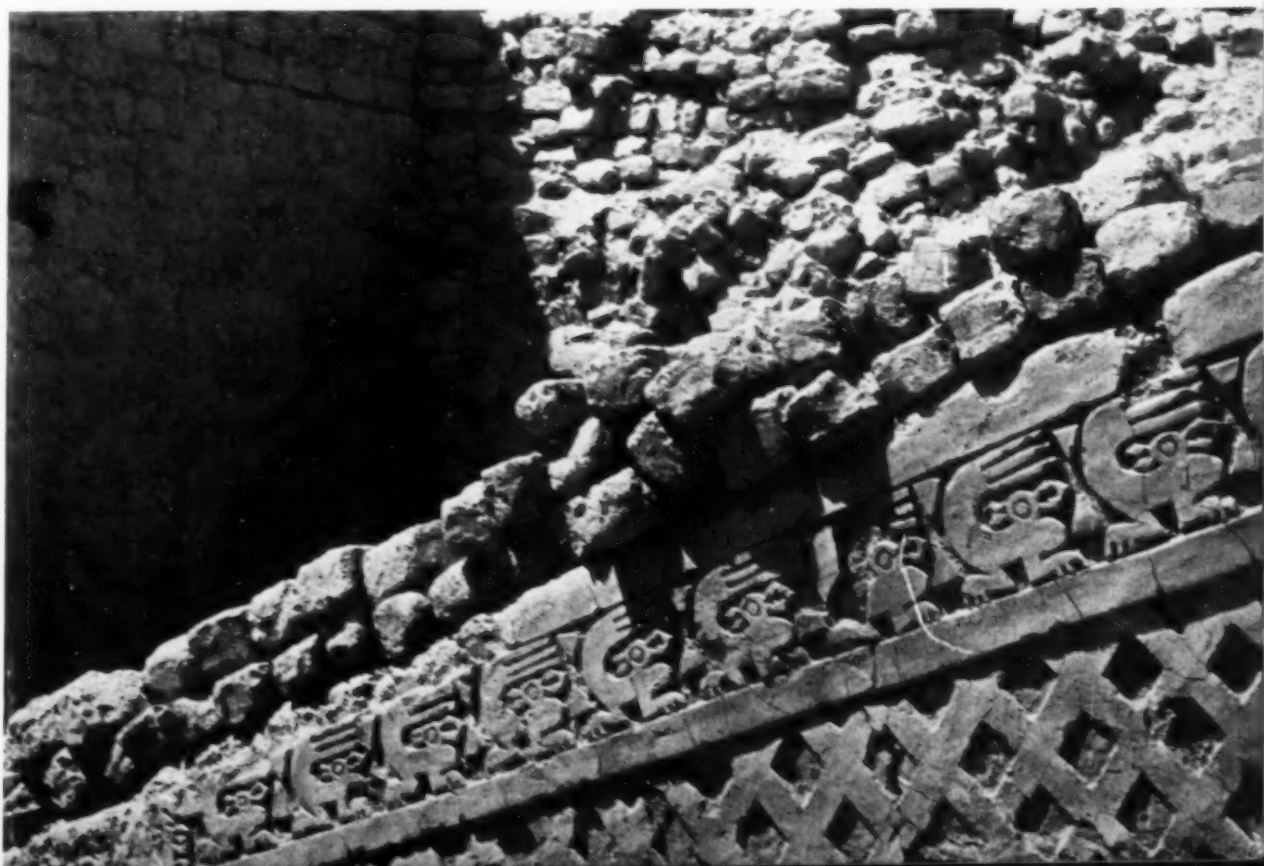






Air view of a section of the city of Chanchan showing the arrangement of walled units, buildings, pyramids, and courts.

Decorated end wall of the ruins at Quinta Esmeralda





The infrequent rains have not yet totally obliterated all design on this formerly striking wall of the city of Chanchan.

Grace Line photo

All *huaqueros* are addicted to the drug, and without it, or so the saying goes, they are men without strength. It is taken for granted that the archaeologist will provide them with a bag of the leaves as a sort of preliminary bonus and out they start in good humour.

There has been much written about the *coca* habit in Peru: that it warps the intelligence, dwarfs the mental energy, that it is a harmful, evil vice, pulling the Indian down to a level from which he will never rise. It is true that, in Inca times, the drug was used only for excitation in very special religious ceremonies; that until the Spaniards came and spread the growth and the habit, the commoner knew little of the pleasure to be derived from the leaf-chewing.

Be that as it may, the mass of labourers will not work without it, and the *coquero*, as he is called, seems to have an amazing strength and endurance for manual labour which is said to surpass that of him who does not chew.

In the front seat of the car sits the archaeologist, adorned with camera, note-

book, tape-measure and compass. In the back are his workers, surrounded by their picks and shovels. Once in the field the archaeologist, trained as he is in the ways of archaeological methods, forsakes for the time all such knowledge in deference to the aboriginal technique while the *huaquero* with his very special system makes his way over the ravaged ground, poking his rod here and there, shaking his head dismally the while. The archaeologist follows him as a suppliant under the spell of a mystic, not understanding but willing to be guided in the intricate ways of this older science.

Finally, for some unknown reason, the senior member of the troop seems satisfied, throws down his rod and begins ripping off his raggedy street clothes. His *baqueta*, delving into the ground has evidently struck a bit of pottery and he examines the end of it for a speck of paint which might have clung. Then — off come the leather sandals, the same type of footgear which was worn by the ancient Chimú. Tightening his red bandana around his waist he opens his bag of *coca*. First a few



Eleven square miles of the city of Chanchan show remains of worn house walls, temples and streets.

Grace Line photo

choice leaves are extracted and go into his mouth. Then he sticks a needle into a little gourd of ash-lime and this in turn into the moistened coca to bring out all the poignance of the drug, while the others follow his lead.

The earth is broken with the rod, then shovelled out. And, where the archaeologist would mark off a trench, the *huaquero* digs a pit and into this pit he leaps with his *baqueta*, burrowing into this side and that, bringing down the dirt around him. As he digs he chews, while the sweat drips from his body. Only occasionally does he take time off to fill an old broken *huaco* with water from the nearest creek. The archaeologist once started to use this same water for his car, but was stopped with a look of horror on the face of his *huaqueros*. To use such filthy stuff for a delicate engine would ruin the machinery!

Suddenly there is a cry from the workmen, for their shovels have hit a skull and an undisturbed grave has been discovered. Out of the hole they jump, for it would never do to continue at once. First they must prepare another wad of

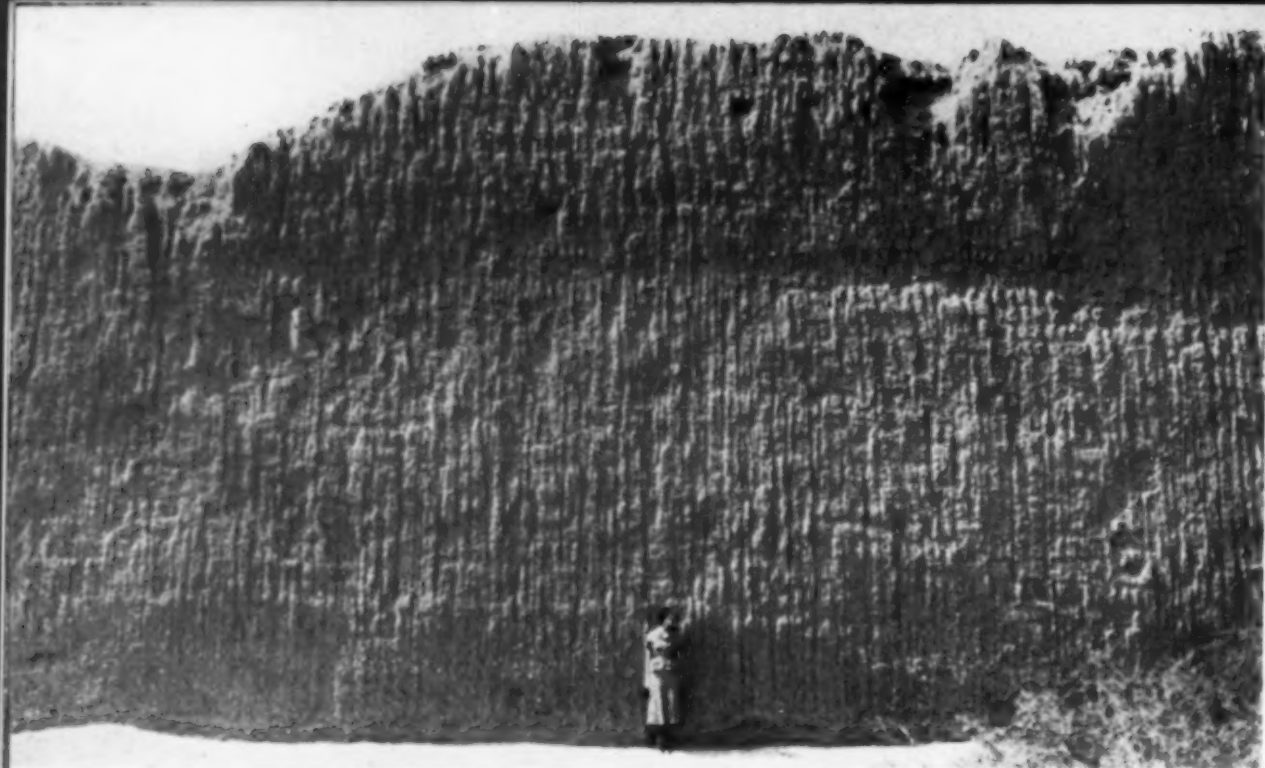
coca, this time for luck. Without this part of the ritual the treasure might vanish, and, as they dig into their pouches for the leaves of the drug, the archaeologist, impatient, leaps down into the hole they have vacated.

Carefully he scoops away the dirt. No longer may the earth be thrown up in shovelfuls, earth which might hold precious bits of broken pottery. On the contrary,

Peruvian whistling jars of blackware from the late Chimú period







A well preserved enclosure wall of one of the units of Chanchan

the picture must be reconstructed in all its exactness. In what direction the body lies, and how it is placed in the grave. Flexed or unflexed burial? That is, were the knees drawn up to the chin, before the body was put in the ground? Or was the man laid horizontally, with his head facing north perhaps? And what is he wearing? Here on the coast, had he come before the treasure hunters, the archaeologist would have been luckier than in some other parts of Peru, where the rains have destroyed all vestige of cloth which might have clothed the dead man. At Chanchan beautiful pieces of tapestry have been found and fine embroidered garments, the result of many toilsome hours on the part of these Chimu people whose main excuse for living seems to have been to weave garments and make pottery to place with their dead.

But this is a poor man's grave. The disintegrating mantle is lifted out carefully and spread on paper so that no unnecessary handling will pull the feeble threads out of their design. Small pieces of greenish, corroded copper are extracted from between the teeth and the headdress removed from a now garrish skull.

Piece by piece, out come the pottery bowls. They are covered with damp earth and almost tremble in the un-

accustomed sunlight. One or two are broken, but the fragments are carefully kept together and as the archaeologist sketches the opened grave in his notebook, he places a mark for each object in its relative position.

Still the *huaqueros* watch amazed. All this work for a bunch of common old cooking pots and still "Meester", as they affectionately call the archaeologist, does not seem disappointed. The scientist is a little disappointed, however. It is only natural for him to want to find some of the fabulously beautiful material he sees in a museum case, as well as every day pots and pans, even though these too have a place in his study.

But in spite of all the discouraging moments, he keeps on working. He not only investigates graves, but he studies the ruins themselves, he spends hours gazing into museum cases. He reads tales of the chroniclers, those first Spaniards who set down on paper many customs of the native Peruvian. Little by little, in spite of destruction wrought by the weather and the treasure hunters, this jig-saw puzzle on which the archaeologist is working, however full of holes it still is, reveals a picture of a well-organized kingdom which, toward the end of its period, covered more than 22,000 square miles of territory.

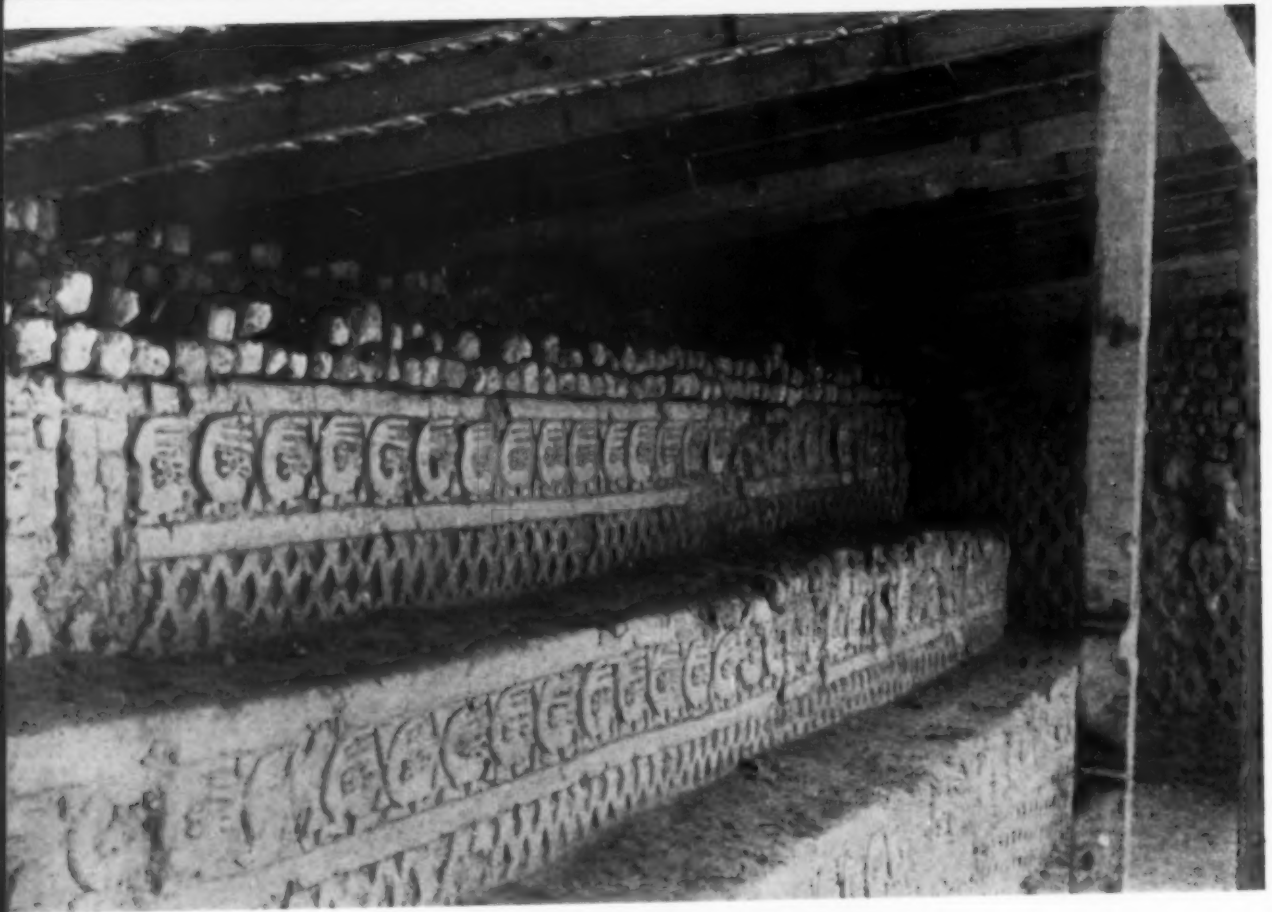




Streets, irrigated gardens, temples, small homes, and stone-lined reservoirs can still be seen in the ancient city of Chanchan.



Fragment of a crested bird design in clay on a wall almost covered with fallen debris at Chanchan.



Top:—The decorated  
terrace section at  
Quinta Esmeralda



Left:—Close-up show-  
ing detail of the wall  
arabesque.

The Chimu kings ruled the coast, and the valley states were welded into one unit. The kings were wont to collect tribute from their vassals in the form of apparel and food. From the mountains came gold and silver and *chaquiras* which are beads or bangles of metal. Skilful artisans constructed great engineering projects, built magnificent monuments to the objects of their worship. A powerful political machine and a capable social organization was developed which reached its climax in adept, artistic expression.

The Moche River rising in the Andes provides a great flow of water for most of the year. Chanchan is dusty now and dry, but in early times this river ran through aqueducts to irrigate the city. It filled cobblestoned reservoirs to conserve water for the season when there was no rain in the mountains and the flow lessened. The ruins, now lifeless, once blossomed in a riot of colour. For miles along the beach a sea wall protected green meadows, and there were gardens yielding several crops a year — sunken gardens laid out with precision and care.

The city itself was made up of departments, walled off from each other, and each with its houses, its temples, its landscaping. There were windows in the pitched-roof homes and doors of plaited grass or hanging reeds. The algarroba tree curved its tough branches around the verandas to preserve shade in the heat of the day. The white plaster of the walls was the base for gaily coloured murals, and in the walls were niches, perhaps for treasure or food or for the display of bright pottery. Sometimes high relief was used to depict stars, leaves, animals and they were interlaced geometric designs. In Trujillo even now are those who can describe how a frieze stood out from a coloured background, before the great rains took away the last vestige of paint.

But the people themselves? There is a legend that in the dim past, *balsa* dugouts brought them from the north. These newcomers were well-governed and their court life was sumptuous and royal. After the death of the ruler there were eleven successors, the last and mightiest of whom

was Chimu Capac or the Great Chimu. He extended the borders of the dominion, making vassals of conquered peoples and putting over them governors to exact tribute. The Chimu kings built up a state of magnificence and ceremony and power.

We do not know that this legend recounted by the chroniclers is true. Perhaps these Chimu people had always lived in the Moche valley, their fathers belonging to some former culture of Peru, just as the Indians and mestizos we see to-day are really the descendants of the Great Chimu's people, though their blood has been mixed with the Chinese, the Japanese, the English and the Spanish.

The thought is a little sad to the archaeologist as he turns his eyes from the great pyramid to the filthy one room hut of his *huaquero*. Or, after fingering a beautifully carved spindle whorl from an ancient grave, he looks around to see an Indian woman using an old potato skin to hold the thread on her stick. On the other hand it is these descendants of the people of Chanchan who make the archaeology of Peru live, as the scientist turns from the grave to the man who is digging, a man who may not bury his dead with knees drawn up under the chin but who still worships the gods of his ancestors even in a Christian church.

Too, these contemporaries wear tattered, machine-made garments, whereas the raiment of their ancestors was colourful and beautiful in design. The ancient Chimu excelled in weaving and many examples of fine cloth have been taken from the dry ground of Chanchan showing in what a royal manner these lords were dressed.

In one cemetery which seems to have been the burial place of kings, mummies have been found richly clothed and adorned with ornaments of gold and silver. Their shirts were long and the mantles flung over their shoulders were woven of the native cotton mixed with llama wool brought down from the sierra. On their heads they wore large sized ornaments which are clearly demonstrated in the pottery designs. These seem always to be





or cactus spine, and the fishermen had nets and sinkers, reed boats, called *balsas*, still in use to-day. Beads and necklaces have been found and ornaments of all kinds made from gold and silver. In one grave was found an object representing an insect in which "the centre of gravity was so well studied that when thrown into the air it imitated flight before falling".

What happened to this city of Chanchan? We are told that the Chimus reigned supreme until the time of the Great Chimu. Then it was that the ninth Inca, Tupac-Yupanqui, and his 50,000 warriors subjugated the coast and sent the bulk of its unappeasable inhabitants as colonists to other parts of the Empire. And when the Spaniards came, 130 years later, the place was practically deserted.

The chroniclers also tell of the methods used to overcome such a mighty empire. The Inca took his position in the foothills above Chanchan and possessed himself of the ravines and the river courses which supplied the plain with water. He constructed dams, diverted streams, causing a wicked drought. When he had terrified the Chimus by these means he let the word go around that next he was going to deprive them of light; whereupon, having broken their spirits and deprived their

bodies of water, the Inca, by the mere force of numbers, vanquished them and carried off their leaders to Cuzco, there to impose his conditions — that the northern coast give up its worship of fish and animals and from that time on worship the sun. This accomplished, the Chimu was sent back to his own land to rule as a prince who was vassal to the Incas. And the story goes that the Chimu always honourably observed the terms imposed upon him.

And yet there are other questions, many more, which fill the mind not only of the archaeologist but of the historian as well. Before the Chimus came the Mochicas, and these people were in many ways more gifted even than those who lived in Chanchan. One of the most intriguing things about Peruvian archaeology is the fact that, the farther back one goes in time, the higher culture one encounters. Were there no beginnings in Peruvian life, when there were no fine *huacos*, no great pyramids, no tapestried cloth? Always the archaeologist is looking for these first peoples who may have come from the north originally, or perhaps from the highlands, but who certainly did not spring up full-fledged in artistic and social achievements.

Some decorated walls at Chanchan combine bird, fish, and animal elements.



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The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography—historical, physical and economic—first of Canada, then of the British Empire and of the other parts of the world in which Canada has special interest. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated and educational to the young, as well as informative to the adult.

The Canadian Geographical Journal will be sent to each member of the Society in good standing. Membership in the Society is open to any one interested in geographical matters. The annual fee for membership is three dollars in Canada.

The Society has no political or other sectional associations, and is responsible only to its members. All money received is used in producing the Canadian Geographical Journal and in carrying on such other activities for the advancement of geographical knowledge as funds of the Society may permit.

## EDITOR'S NOTE-BOOK

E. S. Archibald, B.A., B.S.A., D.Sc., L.L.D., is senior author of the article, "Research in Prairie Farm Rehabilitation". As Director of the Dominion Experimental Farms since 1919, Dr. Archibald has come into intimate touch with all branches of agriculture throughout Canada. In 1935 he organized the work of Prairie Farm Rehabilitation, the research phases of which he describes in this article. Dr. Archibald is a graduate of Acadia University in his native province, and of the University of Toronto. He has received honorary degrees from Manitoba University and Acadia University, is a Fellow of the Royal Society of Canada, and, in 1943, was awarded the Order of Agricultural Merit by the Province of Quebec. Prior to 1919, Dr. Archibald occupied successively the positions of Professor of Agriculture, Nova Scotia Agricultural College; and Dominion Animal Husbandman, Central Experimental Farm, Ottawa.

William Dickson, B.A., junior author of "Research in Prairie Farm Rehabilitation", has been connected with the Dominion Experimental Farms since 1923. Since the inauguration of the rehabilitation programme, he has been engaged in the work of compiling the results of research and of preparing reports and press articles on the progress of the programme. He is a native of Scotland and a graduate of Queen's University, Kingston.

Ruth M. Home, who has provided the article on pottery presented in this issue, was born in Welland, Ontario, and received her primary education at the Normal-Model School, Toronto, continuing on to Jarvis Street Collegiate and the Welland High School. In 1922, Miss Home received

her B. A. in Modern History at the University of Toronto, and, in 1924, her M. A. in Political Science. In 1924-1925 she took time off from her duties as Librarian in the Toronto Public Libraries to avail herself of a Fellowship in the Department of Sociology, Smith College, Massachusetts. In 1928, she was appointed lecturer and guide in the Royal Ontario Museum, and, in 1934, received a Fellowship from the Canadian Committee of the Carnegie Corporation of New York to study ceramics in London, England; in 1935, accepted another from the Summer School in Far Eastern Art and History, Columbia University, and, in 1938, was awarded the American Association of Museums Fellowship for study at the Courtauld Institute of Fine Arts, specializing in ceramics. Supervisor of the Division of Public Instruction, Royal Ontario Museum, since 1939, and lecturer in the Department of Fine Arts, University of Toronto, since 1940, Miss Home is indeed a valuable addition to the group of writers who have contributed to our handicraft series.

Weldon S. Woodson and Raymond W. Thorp, co-authors of "Black Widow: The World's Most Dangerous Spider", have both been writing for various periodicals for a number of years, and are both ardent students of nature in general, and the spider in particular. During the past ten years they have made extensive observations of the black widow (literally thousands of these creatures — not to mention tarantulas and other species — are housed in the basements of their homes), and the fruits of their investigations have been set forth in numerous articles and a book which is to be published in the near future. Thorp has also written a book entitled *Bowie Knife — A Saga of America*, which will

(Continued on page VII)

## ANNUAL MEETING

of  
**The Canadian Geographical Society**

The Society will hold its fifteenth Annual General Meeting in the Lecture Hall, National Museum of Canada, Ottawa, on Tuesday, February 15th, 1944, at 8:30 p.m. Immediately following the meeting, Hon. Dr. Izidor Cankar, Yugoslav Minister to Canada, will deliver an address on Yugoslavia, which will be accompanied by a coloured motion picture on Yugoslav scenery and life and by recordings of Yugoslav folk-songs.



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*Hon. James A. MacKinnon, M.P.,  
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(Continued from page VI)

appear in print after the war; Woodson (who has an M. A. from Columbia University) specializes in nature and scientific articles.

Mrs. W. Garland Foster, who has a nursing diploma, an M. A. (U. N. B.) and a B. L. S. (McGill), is a prolific writer and an experienced speaker who leads an active and varied life. During the last great war, she followed her husband overseas and served there with St. John's and Red Cross hospitals. After the war Mrs. Foster wrote and talked on various subjects, and even served one term as alderman on a man-made city council. After settling in British Columbia, she felt the appeal of Pauline Johnson's life, and so wrote *The Mohawk Princess*; her latest book, still in manuscript form, is an index of British Columbia authors, and, she explains, since most inhabitants of this province seem to feel impelled to write at one time or another, this is proving a mammoth undertaking.

Hope Ranslow Bennett, whose article, "Chanchan—the Home of the Great Chimu", appears in this issue of the Journal, is a Vermonter, and a former librarian at the Museum of Natural History in New York. Mrs. Bennett shared two of the many years spent by her husband in South America assisting in his archaeological work on the coast and in the highlands of Peru. She has published articles on Peru in the *New York Times* and various other newspapers and periodicals, and is, at present, associate editor of a New York women's magazine. Mrs. Bennett now lives in New Haven, where her husband is Professor of Anthropology at Yale University.

#### ERRATUM

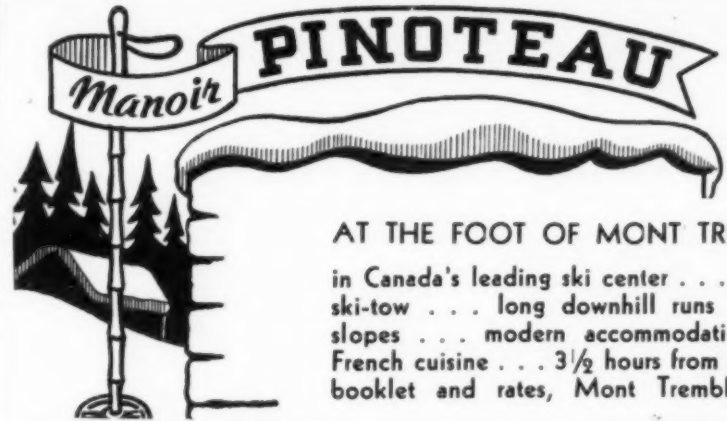
Caption, page 279, December, 1943, issue to read: "C.W.A.C. from Kitchener, Ontario, on September 26th attended the annual Drumhead Service held in Windsor by Windsor and district veterans."

#### APOLOGY

MALAK PHOTOGRAPHS — JANUARY, 1944, ISSUE

The attention of our readers is directed to an entirely unintentional omission in connection with crediting photographs illustrating Professor Lacey's article, "Newfoundland—The Watchdog of the St. Lawrence". All of these (excepting the three on page 16) were provided by Malak—prominent Ottawa feature photographer, to whom we tender our sincere apologies.





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### AMONGST THE NEW BOOKS

*Under A Lucky Star* by ROY CHAPMAN ANDREWS.  
(The MacMillan Co., Toronto. . . . \$4.00.)

Mr. Andrews appears to be one of those fortunate individuals who have been able to realize or even surpass the dreams and aspirations of their youth. Always he wanted to be a naturalist, a collector, leading scientific expeditions into far lands, and, to realize this ambition, he was not above starting with a job of mopping floors in the American Museum of Natural History. From this humble introduction to the sciences, he was promoted to the task of securing the skeleton of a stranded whale, and thereafter for several years devoted himself to, from a layman's standpoint, the rather sticky job of investigating the interior economies of these great mammals. This work led him to Japan and fixed his attention upon Asia where his greatest and most valuable work was carried out. He led three great expeditions into Mongolia, making important palaeontological discoveries, including fossilized dinosaur eggs, which were greatly publicized in the press at that time. The climax of his scientific career came with his appointment as Director of the American Museum of Natural History, whose halls he had scrubbed many years before.

Mr. Andrews writes in an easy, conversational style, and it is evident that his fame as a raconteur should be second only to his reputation as a scientist. It might also be said that as a result of his devotion to science the business world lost a great promoter with a remarkable flair for advertising, who was able to interest rich and poor alike in providing financial backing for his expeditions. Always a good and robust liver, a sportsman and a man among men, he made a multitude of friends among the great and near-great of our day, and, one may suspect from his sturdy character, a fair proportion of enemies. Now retired, he lives the life of a country squire on his Connecticut farm with his guns and dogs and a spot or two of amateur farming.

A book that appears to be as characteristic of its author as his own signature, and withal as pleasant and entertaining an evening's reading as will be found in many a day.

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## AMONGST THE NEW BOOKS

(Continued)

*New Zealand*, by WALTER NASH (Collins, Toronto, \$3.75). The author of this book, Walter Nash, now the New Zealand Minister to the United States, has been a prominent figure in the New Zealand Labour Party for many years and, since that party assumed office in 1935, has been Minister of Finance, and Deputy Prime Minister. After a brief introductory chapter, descriptive of the country and its people, Mr. Nash devotes much of his attention to the recently enacted social security legislature for which he, personally, was largely responsible, and to New Zealand's wartime organization. He deals briefly but effectively with the magnificent record of the New Zealand troops and navy in the current war and shows a broad understanding of post-war requirements in the Pacific area.

New Zealand has long been famous for its progressive social legislature. Its situation, remote from any neighbouring state and its homologous population have made it an ideal proving ground for social experiments. In concentrating so much on the New Zealand of to-day, Mr. Nash has, perhaps, been less than just to his predecessors in office, and the omission of any reference to the great and historic part that New Zealand played in the first Great War is difficult to understand. One gets the impression that Mr. Nash has so identified himself with the party of which he is a member and with its policies that, in his mind, New Zealand had hardly existed before 1935.

Obviously writing for the American reader, Mr. Nash is at pains to explain the loose but effective organization of the British Commonwealth which foreigners find so hard to appreciate, and he sees in it a hope for a broader commonwealth which will include nations and men of goodwill throughout the world. A valuable and important book particularly in its exposition of New Zealand's social schemes, the distributions of their benefits and their cost.

P. E. P.

*Man and His World. Book II. Study of the Evolution of the Modern World* by JAMES MAINWARING, M.A. George Philip & Son, London, 6s.

This is the second of a series of three text books by the same author, the first of which, the *Evolution of the Old World*, was reviewed in the *Canadian Geographical Journal* of January, 1942. The current volume commences roughly at the end of the medieval period and summarizes world history to modern times, together with brief references to the physical aspects of man's environment.

The book has been designed as a text book, presumably for students of the twelve to fourteen-year-old class, and as such has very little to offer the general reader. It does, however, provide a useful summary of the main historical events and tendencies of the past four hundred years, particularly as regards Great Britain and the British Empire. The sections on Canada and the United States contain several mis-statements and misconceptions which could readily have been avoided by a more careful checking with authorities. This

leaves the reader with a feeling that the information regarding other countries, with which he is not so familiar, may be equally misleading.

The book is embellished with numerous useful, diagrammatic maps. The omission of a legend from several of these maps, however, somewhat detracts from their value. There is an index, a list of texts suggested for supplementary reading and suggestions for teaching procedure.

P.E.P.

*Aerial Photographs and Their Applications* by H. T. U. SMITH, Assistant Professor of Geology, University of Kansas. D. Appleton Century Company, New York. \$3.75.

Air photography has now come to be not only the basic method in most topographic mapping, but is equally important in geological surveys, physiography, forestry, agricultural studies, and many types of engineering investigations. It has long been the favoured playground of the mathematically-minded since, given certain fundamental data, the air photograph can be developed into a map in many different ways, and a wide variety of plotting procedures have been worked out in a detail far beyond any possibility of practical application. In this way the emphasis has too frequently been placed on the plotting of the maps, and too scanty attention has been given to the actual interpretation of the topographic features which, in their completeness and infinite detail, represent much of the value of air photography.

Professor Smith, in this book, finds a happy medium between what might be termed the fundamentalist school, whose interest lies mainly in the correct determination of a few control points, and those whose attention is directed more toward the accurate interpreting of the information on the photographs. He gives a careful description of the basic mathematical features of the air photograph together with the simple methods of plotting and the elements of stereoscopy. He then turns his attention to the interpretative phases of the subject, giving the reader, by numerous excellent examples selected from the collections of the United States Department of Agriculture and of the Royal Canadian Air Force, the principles necessary for obtaining from the photographs the topographical and geological information, forest cover, and all the complexity of detail that can be obtained by careful study. This is, of course, only an introduction to the subject, and the user of air photographs will, with experience, develop his own technique for his own specialty.

The book is more particularly intended for the engineer, forester and geologist, who finds in the air photography one of the most useful of tools, and needs to learn in simple terms how to make intelligent use of its many possibilities. This is an excellent book which is not beyond the interest of the layman reader and which will be of great value to those who make use of air photography in their professional work. It is beautifully illustrated and printed, and includes many useful diagrams and an index, glossary, and bibliography.

P.E.P.